Reference < TMI_TD_MAN_09_088_001_001_1300.docx>
Version < V 1.3>
Date <20/04/2010>

GUI - USER MANUAL

Approbation Table

Company	Nanoplas	Agileo Automation
Name		
Date		
Signature		

REVISION TABLE

Date	Version	Description	Author
31/07/2009	1.0	Initial version	MV
19/11/2010	1.1	Photo Diode integration	OT
20/04/2010	1.3	DSB 6000 & 9000 merged into same software	OT

TABLE OF CONTENTS

1. DOCUMENT INTRODUCTION

1.1. SCOPE

The key purpose of this document is to describe the DSB Series Equipment Controller Software and its main use.

1.2. INTENDED AUDIENCE AND READING SUGGESTIONS

This document is intended for users and testers.
Please read section 1.3 for main system definitions, acronyms and abbreviations.

The document is divided up into chapters.
The second chapter introduces the tool.
The third chapter provides an overview of the graphical user interface.
The fourth chapter describes general software interface.
The fifth chapter describes the software User/Tool interface.
The sixth chapter describes Recipe/Module creation.
The seventh chapter describes Service navigation panel.
The eighth chapter describes the Setup navigation panel.
The ninth chapter describes the Datalog navigation panel.
The tenth chapter describes the Alarm/Warning navigation panel.
The eleventh chapter describes the Help navigation panel.

1.3. DEFINITION, ACRONYMS AND ABBREVIATION

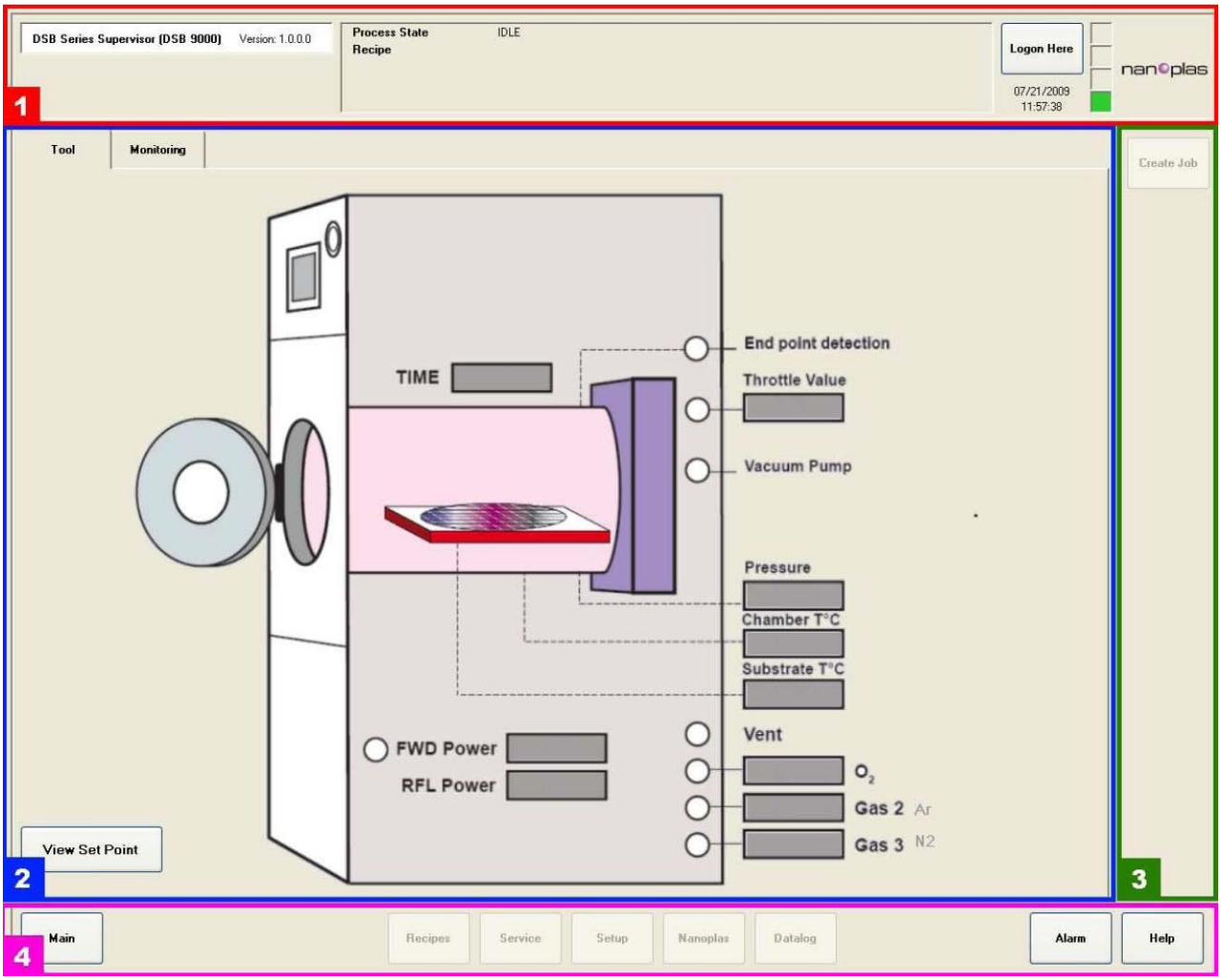
Definition, Acronyms and Abbreviations	Description
ECS	*Equipment Controller Software*
GUI	*Graphical User Interface*
HMI	*Human/Machine Interface*
Module	*Represents a set of parameters that describe precisely the conditions (temperature, pressure, flow...) of plasma treatment.*
Recipe	*Collection of module (1 up to 6) to be executed sequentially*
RF	*Radio Frequency*
MFC	*Mass Flow Controller*
SP	*Set Point*
OPC	*OLE for Processing Control (OLE means Object Linking and Embedding)*

2. DSB SERIES INTRODUCTION

DSB Series devices were designed to perform dry etch process. The operator sets the wafer to be cleaned inside the process chamber, selects a recipe among those stored in PLC memory, and when the door is closed the plasma treatment starts.

3. SOFTWARE GUI OVERVIEW

The human/machine interface is compliant with SEMI standard E95-1101.



DSB Series Equipment Controller Software consists of four main parts:

1. Title Panel
2. Information Panel
3. Command Panel
4. Navigation Panel

The **Title Panel** is a horizontal area at the top of the window, above the Information and Command panels. It is display all the time and contains the following elements:

- The name of device and software version
- Name of executing Recipe and its current state
- The date/time
- Logon/Logoff button
- NANOPLAS's logo

The **Information Panel** displays a view or views of the graphical information and graphics for each functional area. Graphics and other display objects are shown on this panel to achieve the control and monitoring capability required.

The **Command Panel** is a column of command buttons on the right-hand side. The Command Panel only relates to the Information Panel currently being shown.

The **Navigation Panel** is used to switch between functional areas.

4. GENERAL USER INTERFACE

4.1. ACCESS RIGHTS MANAGEMENT

Operators do not have the same knowledge or authorization to use the software. That is why there are several access levels depending on user's experience and task to be done. In order to access to different screens, the operator have to be connected with a user name and a password.

The software allows up to 8 access levels, numbered from 0 to 7. Level "0" does not need to be connected and allow only "visualization" mode. Level "7" is the highest and it is reserved to NANOPLAS.

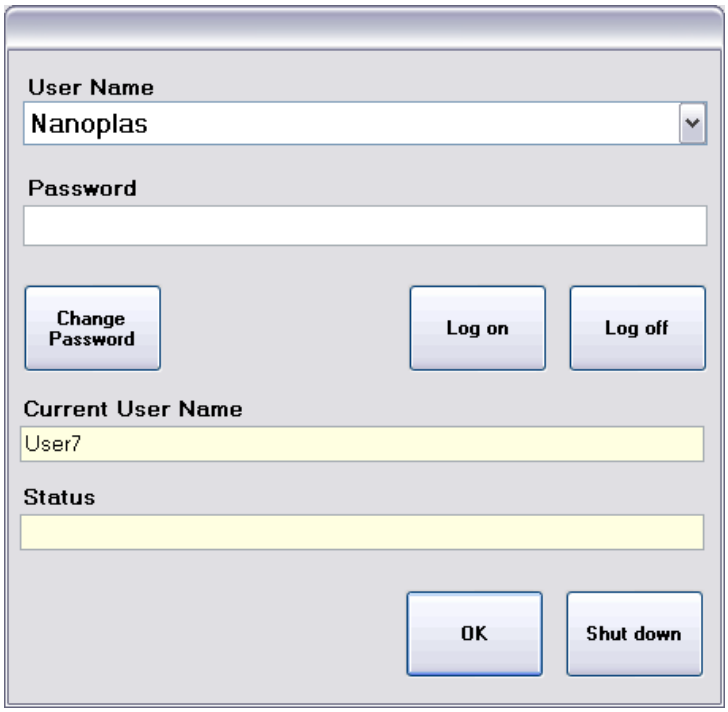
GUI's elements not accessible to the user who have not the required access level are displayed in gray. Their status is disabled.

4.2. LOGON WINDOW

4.2.1. ***CONNECTION PROCEDURE***

In order to use the software and access to any screens, the user must be connected. **Logon** button is located in the title panel. Once the user is connected, logon button's text becomes the user name.

On click on **Logon** button, the following dialog box appears:

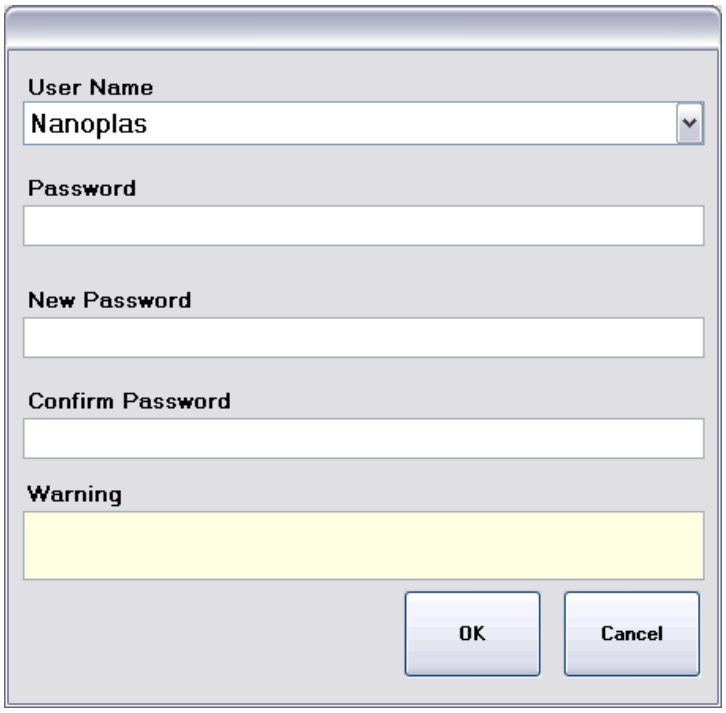


The user needs to select a **user name**, enter a **password** and click on **Log on** button. If a user is already logged, field **Current User Name** displays his name. To be logged off, click on **Log off** button. **Status** field displays some information about current operation and its result. **Change Password** button appears once the user is logged and allows password to be changed.

OK button allows closing the Logon dialog box. **Shut Down** allows user to close the software.

4.2.2. *CHANGE USER'S PASSWORD*

On **Change Password** button's click, the dialog box becomes as follow:



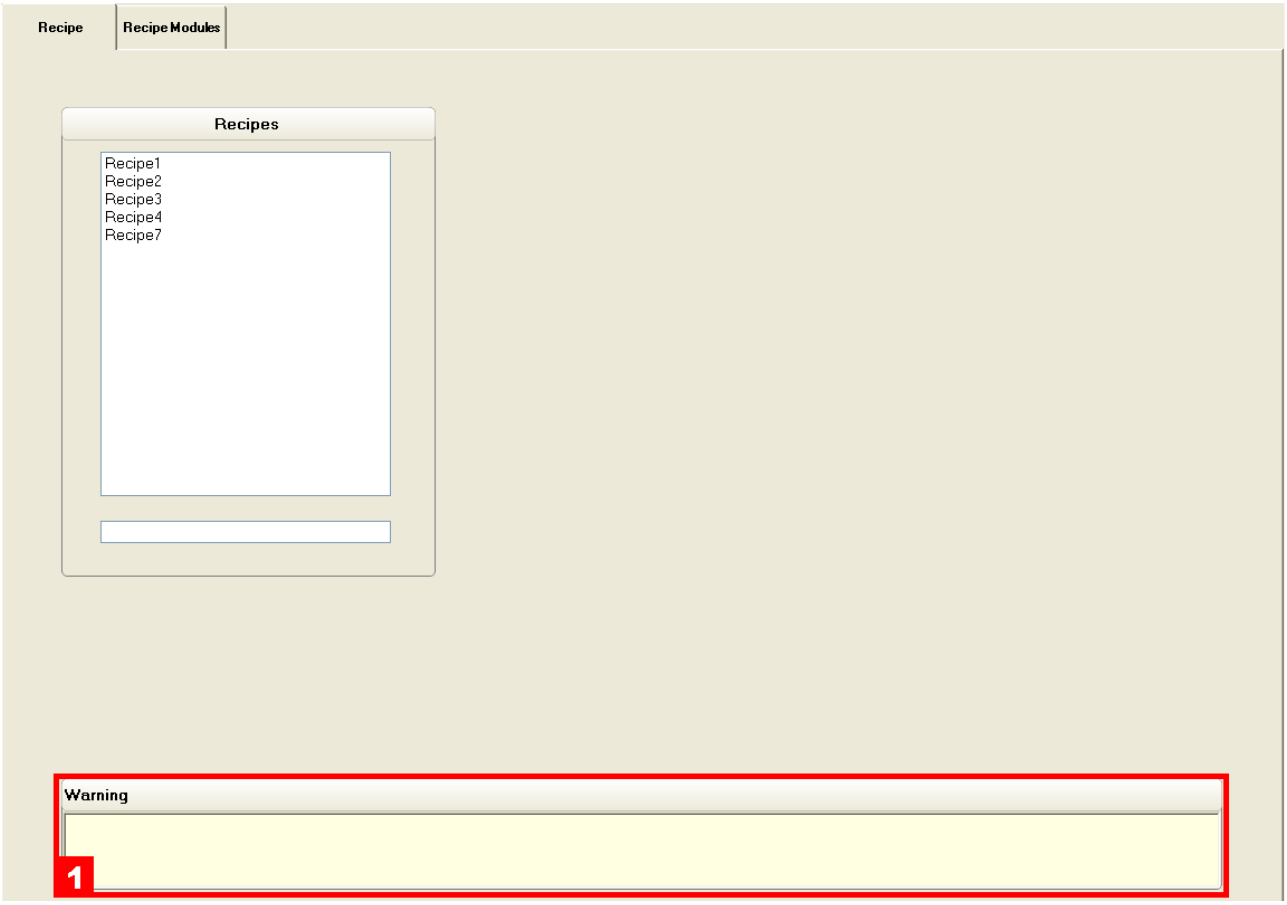
To change password the user must enter his current password inside **Password** field and the new password inside **New Password** field. **Confirm Password** field is used to confirm the new password, so it must be the same as **New Password** field.

In case of errors, **Warning** field displays a message that indicates the wrong action or the procedure to be done to resolve the issue.

To save new password, click on **OK** button. To cancel the operation, click on **Cancel** button.

4.3. WARNING

Most of information panels include an area **Warning** (1). It is used to guide the user; it may contain a proposal for the next task or a warning message about a wrong action done by the operator. It is normally located at the bottom of information panel.

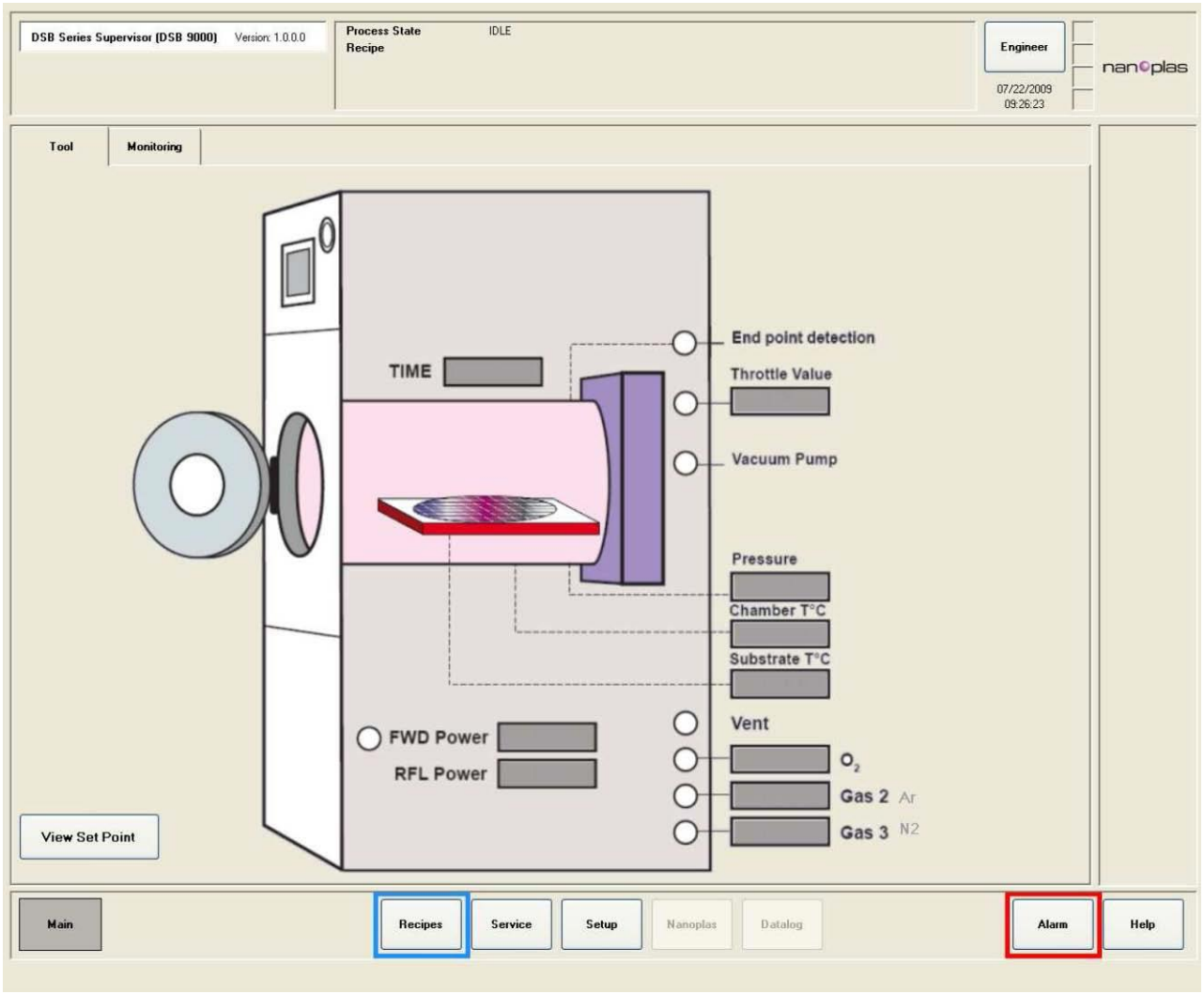


4.4. SALIENCE MANAGEMENT

Border around buttons is used to display the state of corresponding functional area. It is a method to attract the attention of the user in an incomplete, a warning or a particular state.

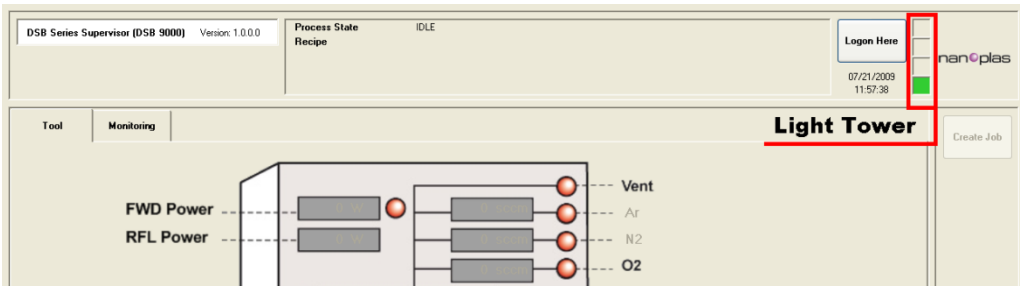
Used colours correspond to following states:

- **Red** indicates an alarm
- **Blue** indicates an unfinished action
- **Yellow** indicates a warning
- **Green** indicates that user must be focus on this area



4.5. LIGHT TOWER

The light tower's display is located inside title panel as indicates on the screenshot below:



Light tower's control represents the command send by PLC to the real DSB light tower. It is used to identify the state of the device with colour signification as below:

Green:

- **On** – N/A
- **Off** – Not powered
- **Blinking** – Idle state

Yellow:

- **On** – N/A
- **Off** – N/A
- **Blinking** – Performing a process

Red:

- **On** – N/A
- **Off** – No active alarms
- **Blinking** – At least one active alarm

Blue:

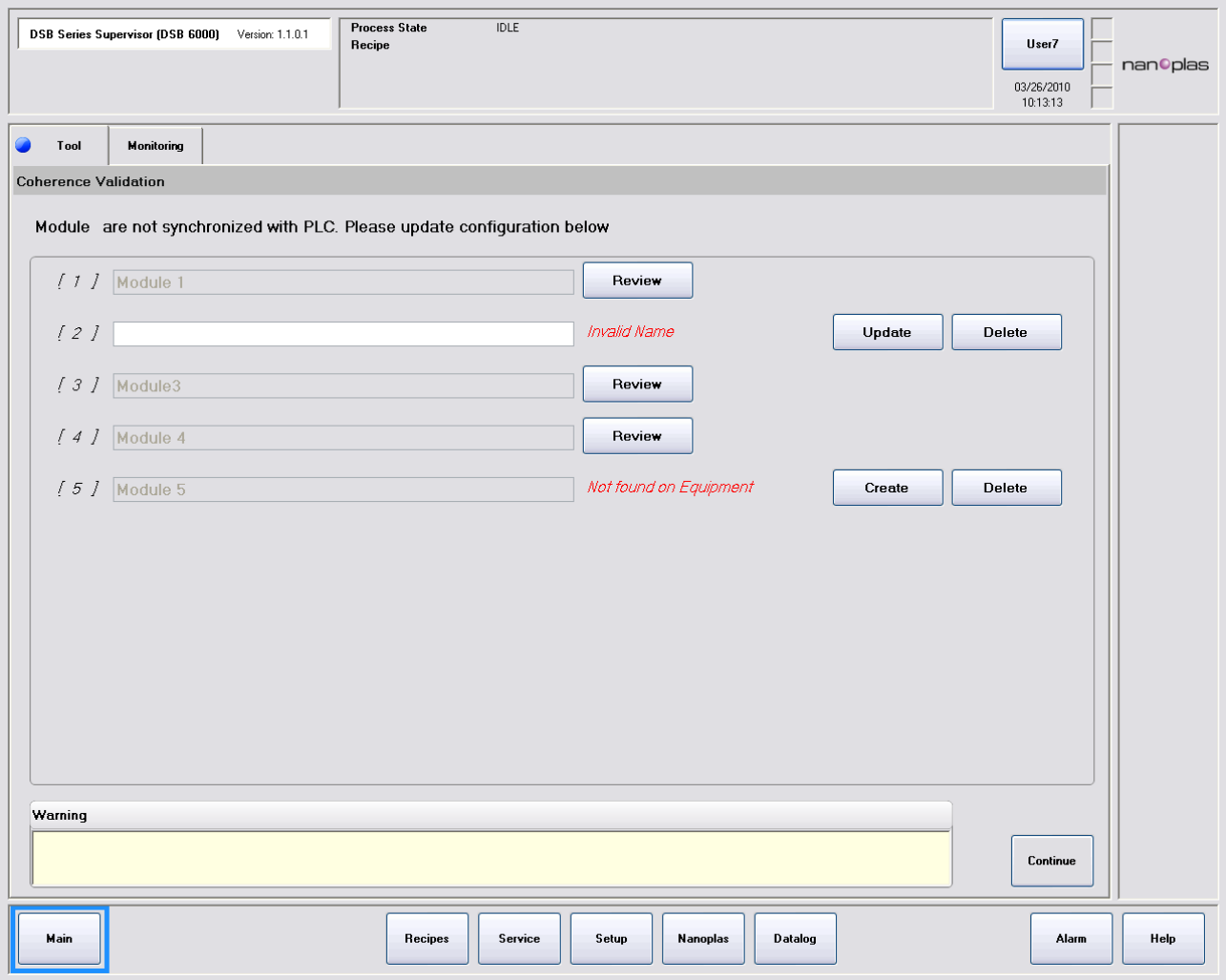
- **On** – N/A
- **Off** – N/A
- **Blinking** – Wait for an user entry

4.6. START UP OF APPLICATION

Hardware equipment stores Module and Recipe using an index. Operator manipulates these using a textual name stored inside the PC Software.
At start up, a coherence verification is done to ensure that the hardware Module and recipe lists are compliant with PC software lists.

If differences are found, the operator has to correct errors using a panel specific to the recipes, another one for Modules:

4.6.1. *COHERENCE VERIFICATION PANEL FOR RECIPES*

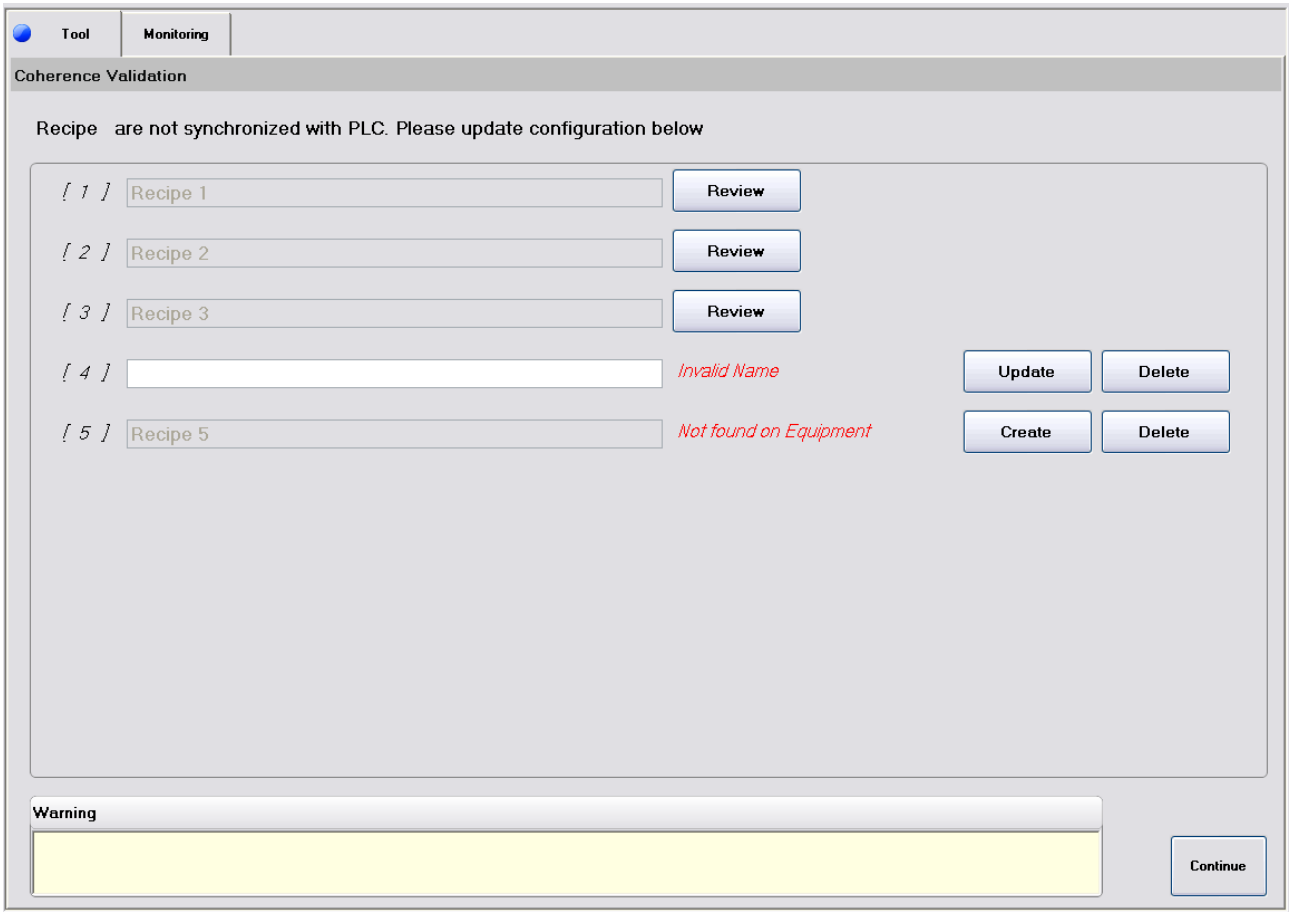


Operator has to enter a valid textual name and press the **Update** button. If he considers that the recipe stored inside the hardware equipment is not valid, he can remove it using the **Delete** button.

If the Recipe is not found on equipment, the Operator has either to create the recipe, either to remove the textual name using the **Delete** button.

Press the **Continue** button when all errors are recovered.

4.6.2. *COHERENCE VERIFICATION FOR MODULES*



Operator has to enter a valid textual name and press the **Update** button. If he considers that the module stored inside the hardware equipment is not valid, he can remove it using the **Delete** button.

If the module is not found on equipment, the Operator has either to create the module, either to remove the textual name using the **Delete** button.

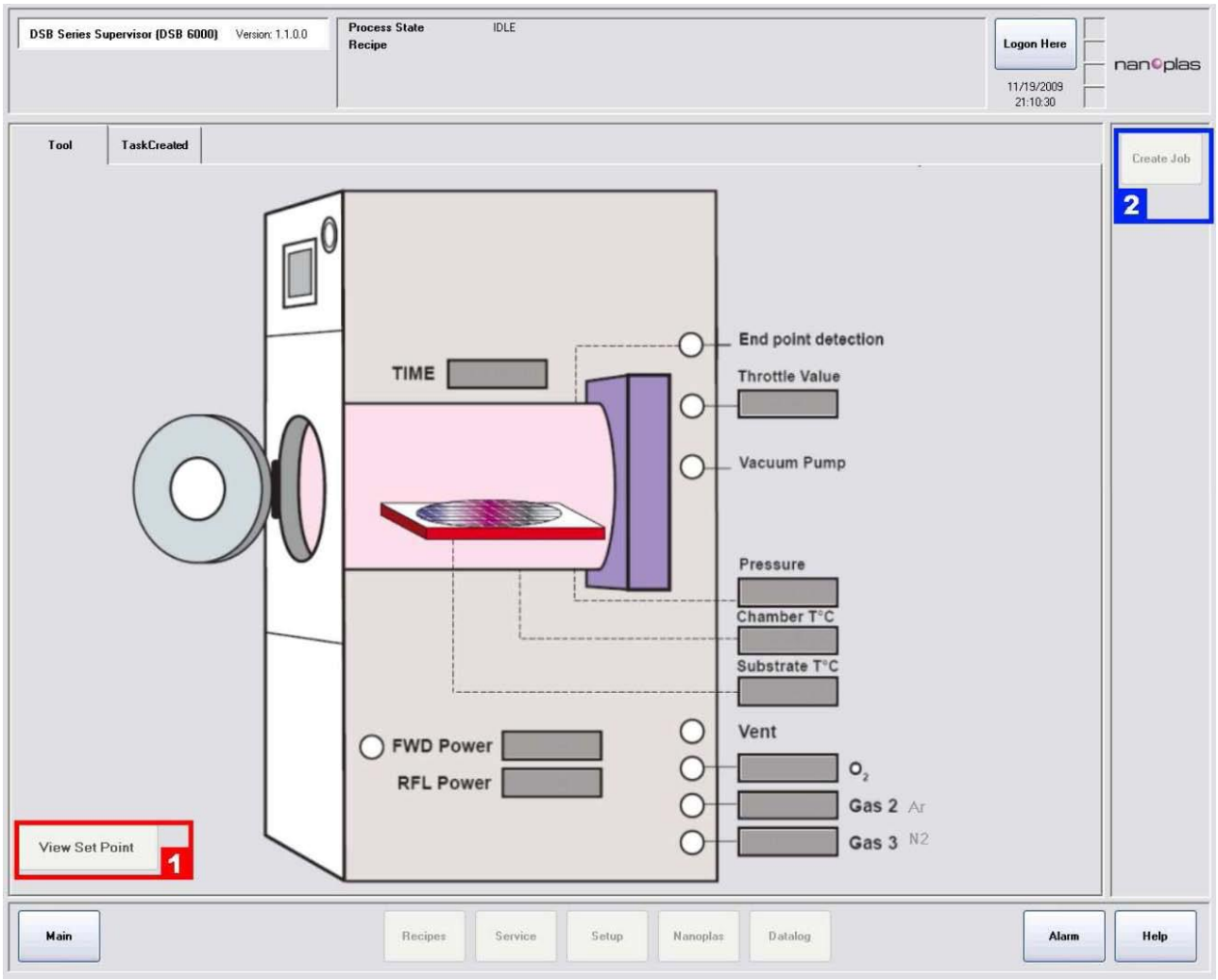
Press the **Continue** button when all errors are recovered.

5. "MAIN" MENU

5.1. TOOL TAB

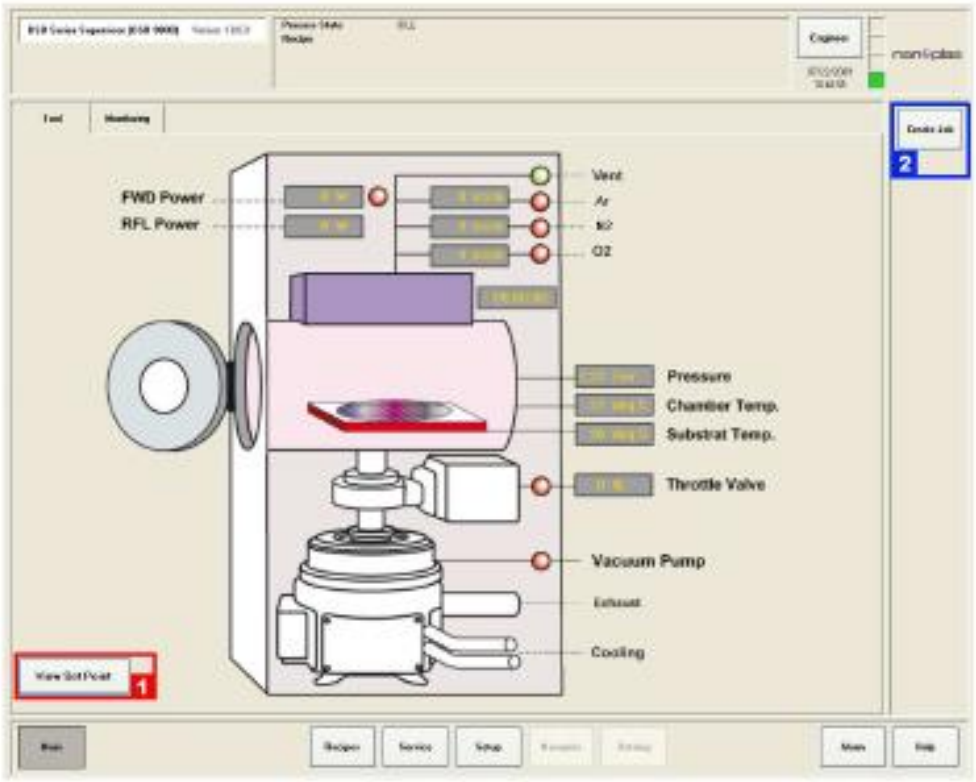
5.1.1. *PRESENTATION*

Tool tab contains a representation of the selected device that can be DSB 6000 or DSB 9000 and indicates all process values. It also allows operator to start a process by clicking on **Create Job** button (2). **View Set Point** button (1) can be used to display all set point values.

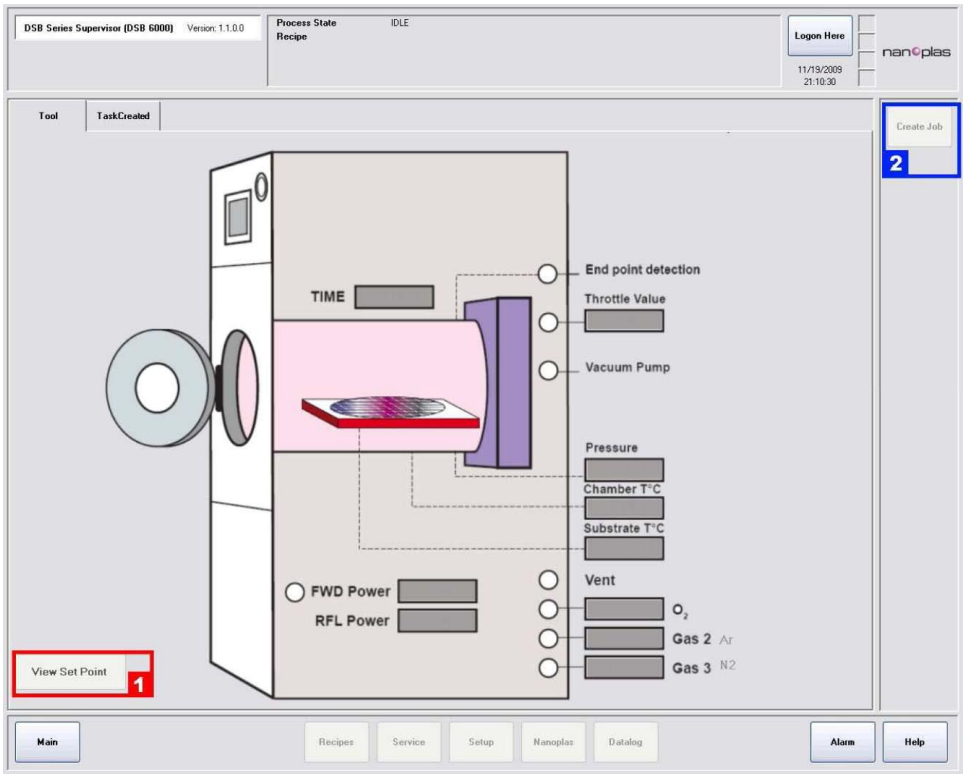


5.1.1.1. DISPLAYED DEVICE

5.1.1.1.1. DSB 9000



5.1.1.1.2. DSB 6000



5.1.1.2. ACTUATOR STATE

Actuator state (RFG on/off, valve…) is represented by a control that looks like a LED. There are two representations:

 Indicates the actuator is **ON.**

 Indicates the actuator is **OFF.**

5.1.1.3. PROCESS VALUE

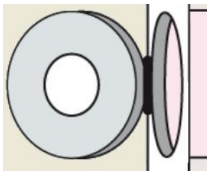
Probe's values are displayed by the process value control. It indicates the current measured value and its unit.

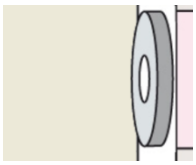
5.1.1.4. SET POINT VALUE

Module parameters are displayed by the set point value control. It indicates value configured in the Module and its unit. This control is shown while **View Set Point** button is click, it replaces process value but colour is changed to blue.

5.1.1.5. DOOR STATE

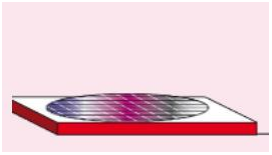
The state of door is also displayed:

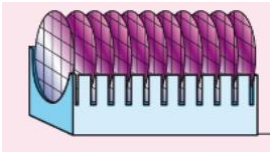
 Indicates the door is open.

 Indicates the door is closed.

5.1.1.6. WAFER

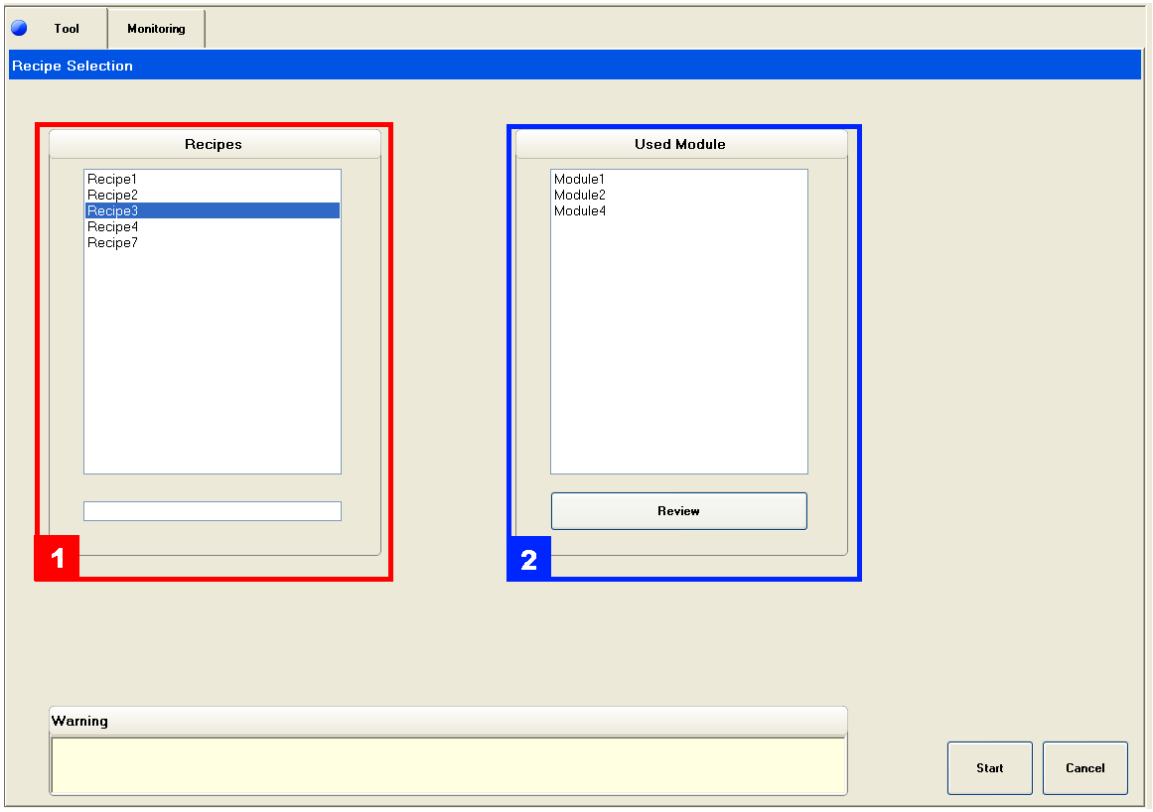
DSB-9000 can perform process on one wafer or on multiple wafers (cassette). An option in the Setup menu allows an authorized user to change the Tool representation in one of the following:





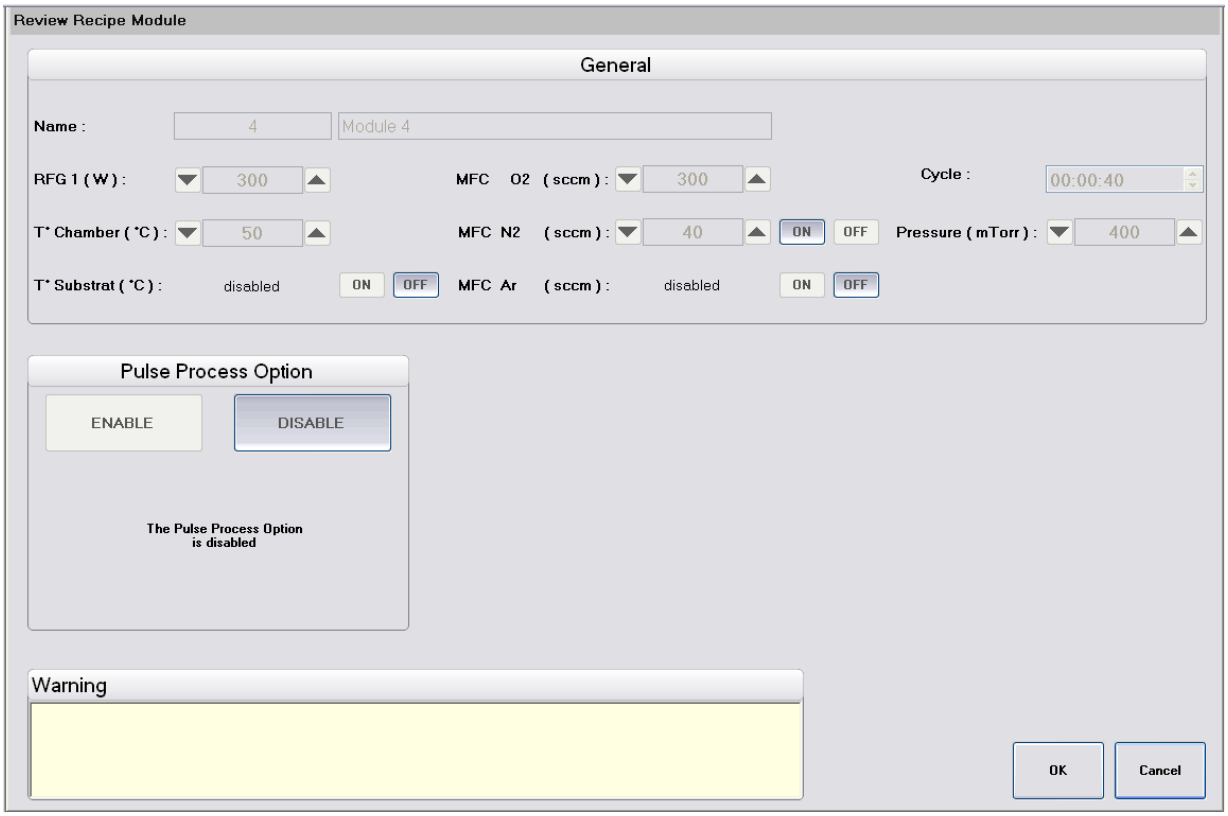
5.1.2. ***CREATE JOB***

When operator clicks on **Create Job** button, the **Recipe Selection** dialog box appears.



Recipe area (1) contains the list of existing recipes, and below a "filter" field. If this field is not empty, only recipes that contain field's letters are displayed.

Used Module area (2) contains the list of modules used in selected recipe and a **Review** button. If this button is clicked, a new dialog, with module parameters, appears.

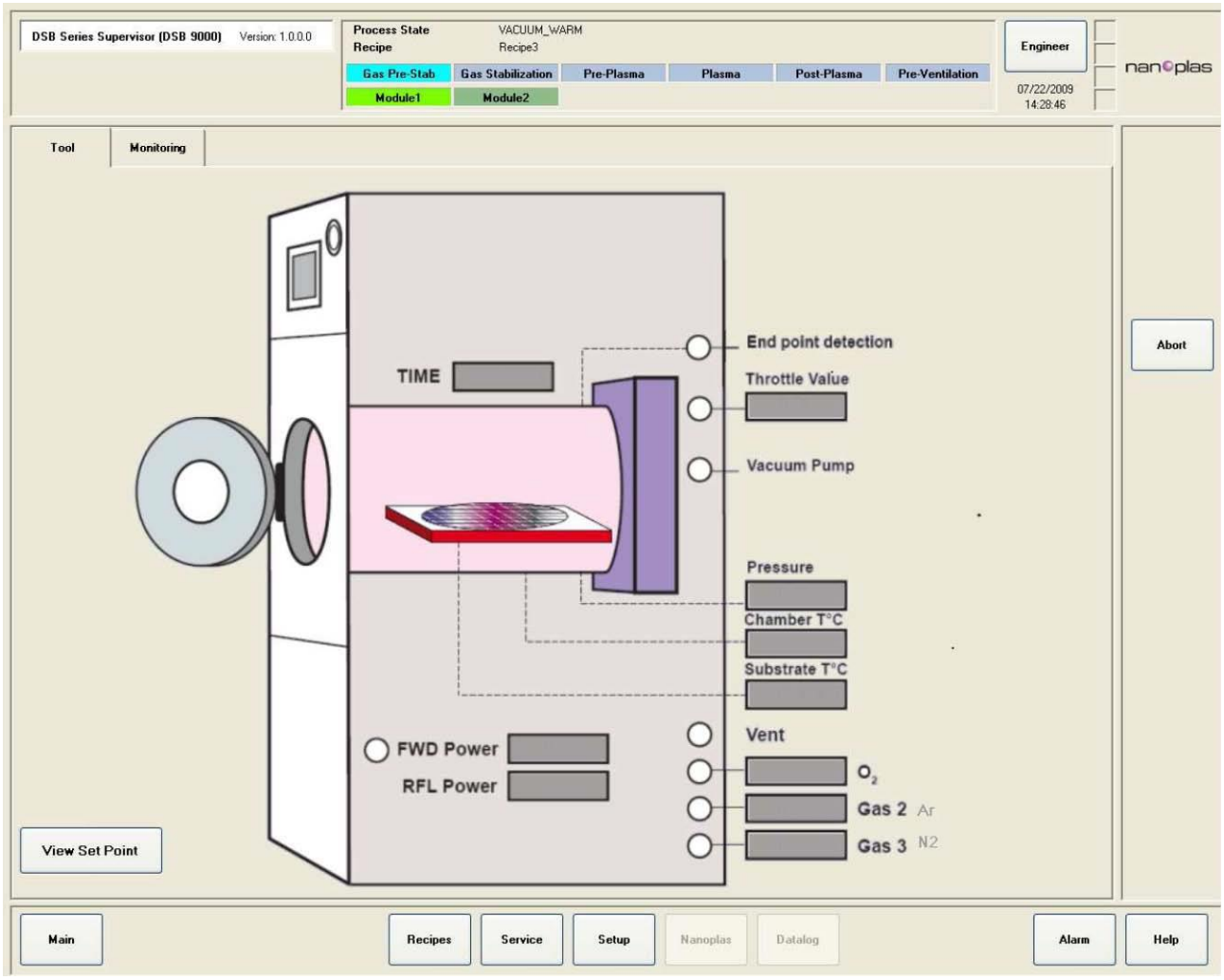


This dialog box is describe inside §6.2.2 Module creation. When a module is reviewed, all parameters are displayed but none can be changed. To close this dialog box, click on button **OK** or **Cancel**.

To start the recipe click on button **Start**, or click on button **Cancel** to abort the start of recipe.

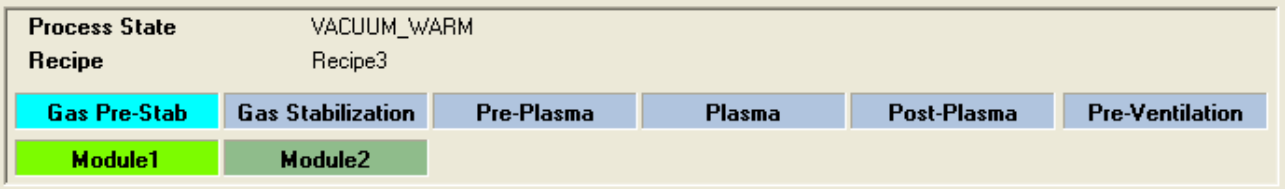
5.1.3. ***RECIPE EXECUTION***

Once the **Start** button of **Recipe Selection** dialog box has been clicked, and selected recipe contains no error, the Tool panel is show. PLC will start the recipe only if the door is closed. When recipe starts, title panel is updated.



During Recipe execution **Command Panel** (see §3 Software GUI Overview) is updated and **Abort** button appears. This button allows the operator to abort current Recipe.

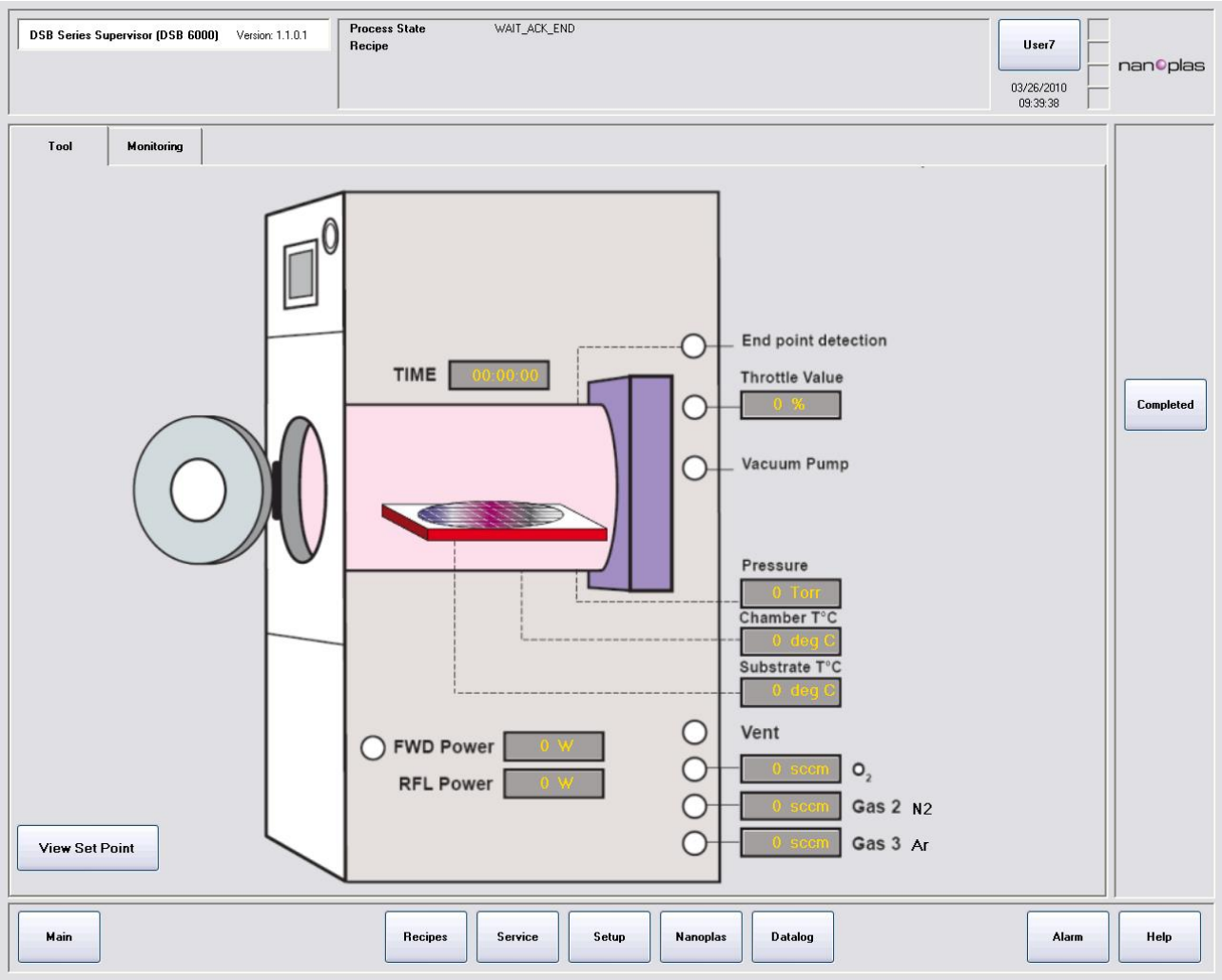
5.1.3.1. TITLE PANEL DURING EXECUTION



During process, title panel displays the state of PLC in **Process State** field, the name of processing Recipe in **Recipe** field and the list of Module to be processed. The current processing Module and its current state are highlighted, here current Module is **Module1** and its state is **Gas Pre-Stab**.

5.1.4. ***END OF PROCESS***

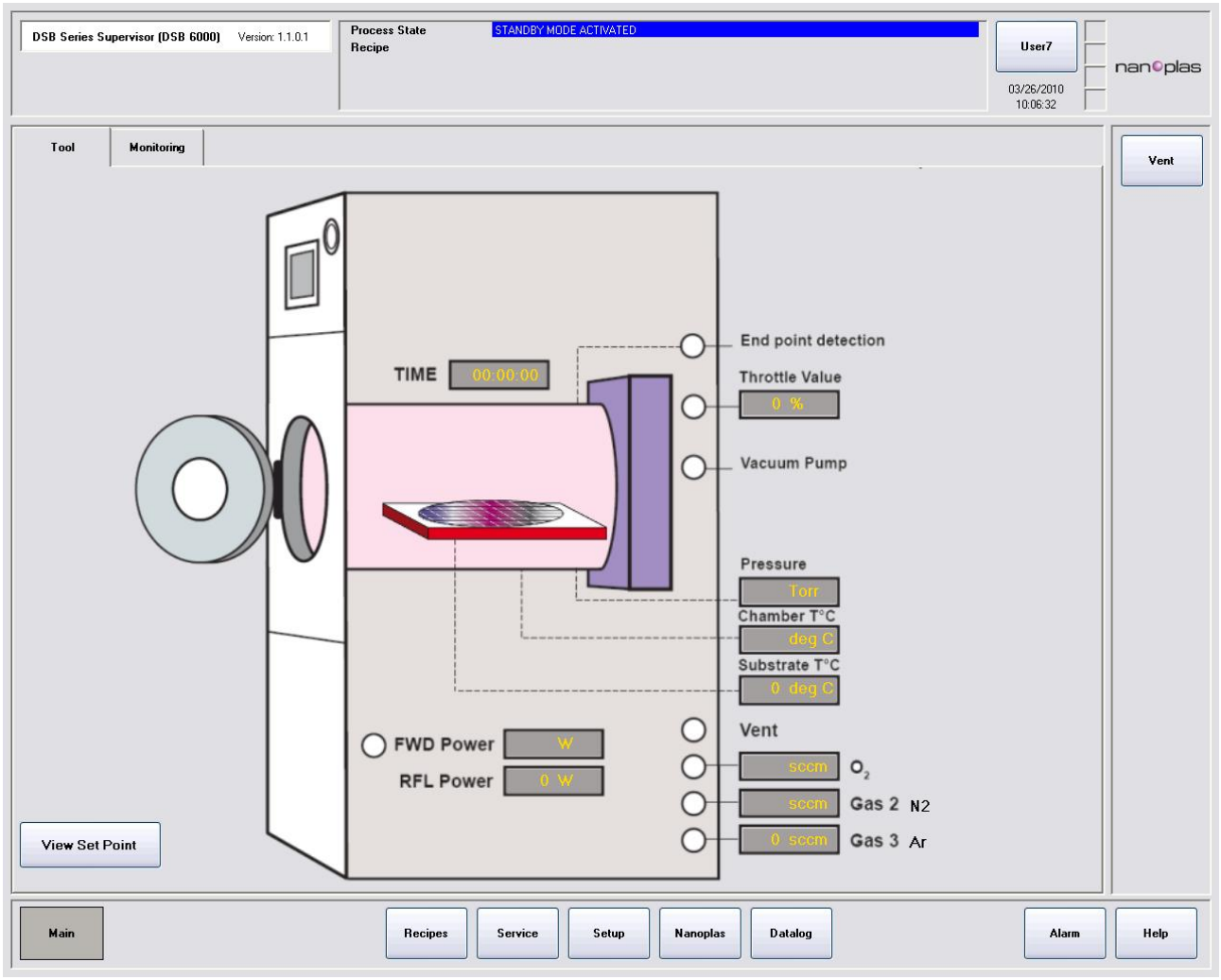
At the end of process the software waits for operator to acknowledge this end, **Command Panel** is updated and **Completed** button is show.



5.1.5. ***STAND BY MODE***

If the tool is in IDLE since a long time (Time Out has to be configured in Process Constant panel), the equipment goes automatically in StandBy mode.

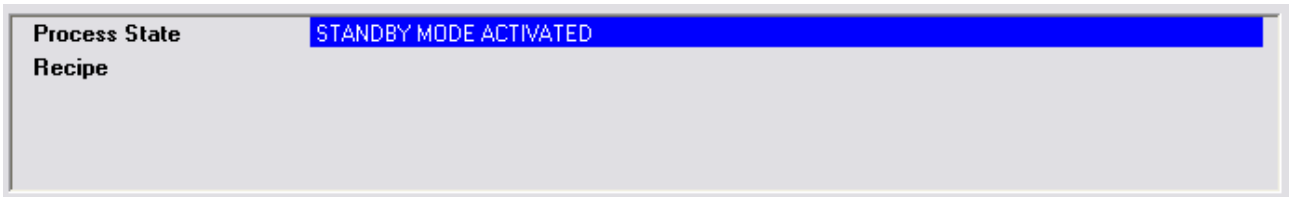
In this mode, operator has to activate the equipment first before starting a new recipe using the **Vent** button.



5.1.5.1. TITLE PANEL DURING STAND BY MODE EXECUTION

During this mode, title panel displays the state of tool as shown below:

1 Tool goes to Stand By mode



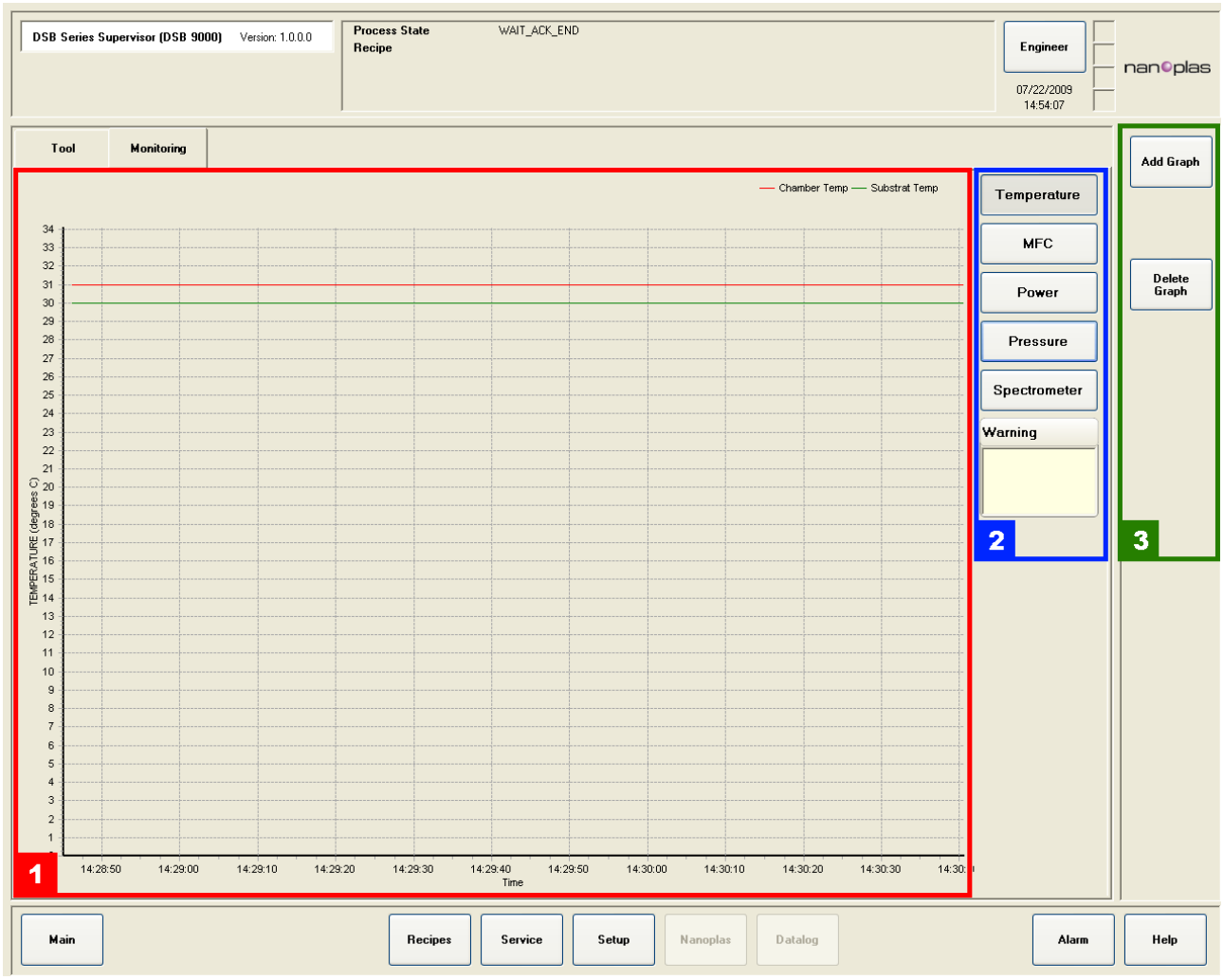
2 Tool is in Hibernating state (Stand By mode)

3 Tool goes to Production mode

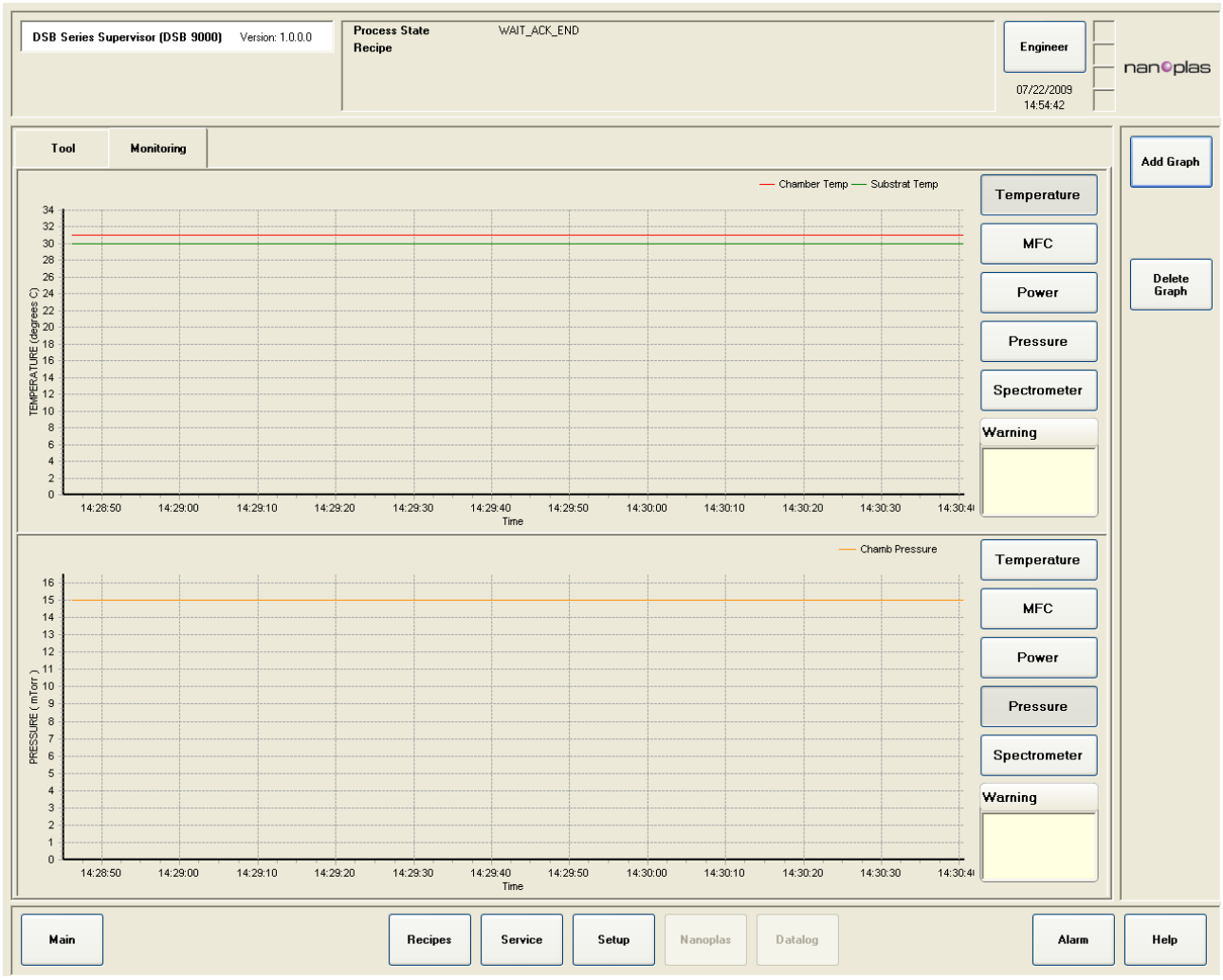
5.2. MONITORING TAB

5.2.1. ***PRESENTATION***

This tab is used to trace process values in function of time. **Graphic area** (1) displays the curves, with automatic axes and legend of point colours. **Data area** (2) displays some button allowing to show curves on graph depending on their kind (temperature, pressure, …) and a warning box. Only two kinds of data can be displayed on one graph, scales of each data are in a side of graph (left or right). **Command Panel** (3) is updated and displays **Add Graph** button and **Delete Graph** button.



A click on **Add Graph** button will split the information panel and show another graph as following. A click on **Delete Graph** button will delete the second graph and show the previous screen. There is already one graph displayed, even if there is no data.



5.2.2. ***EXECUTION***

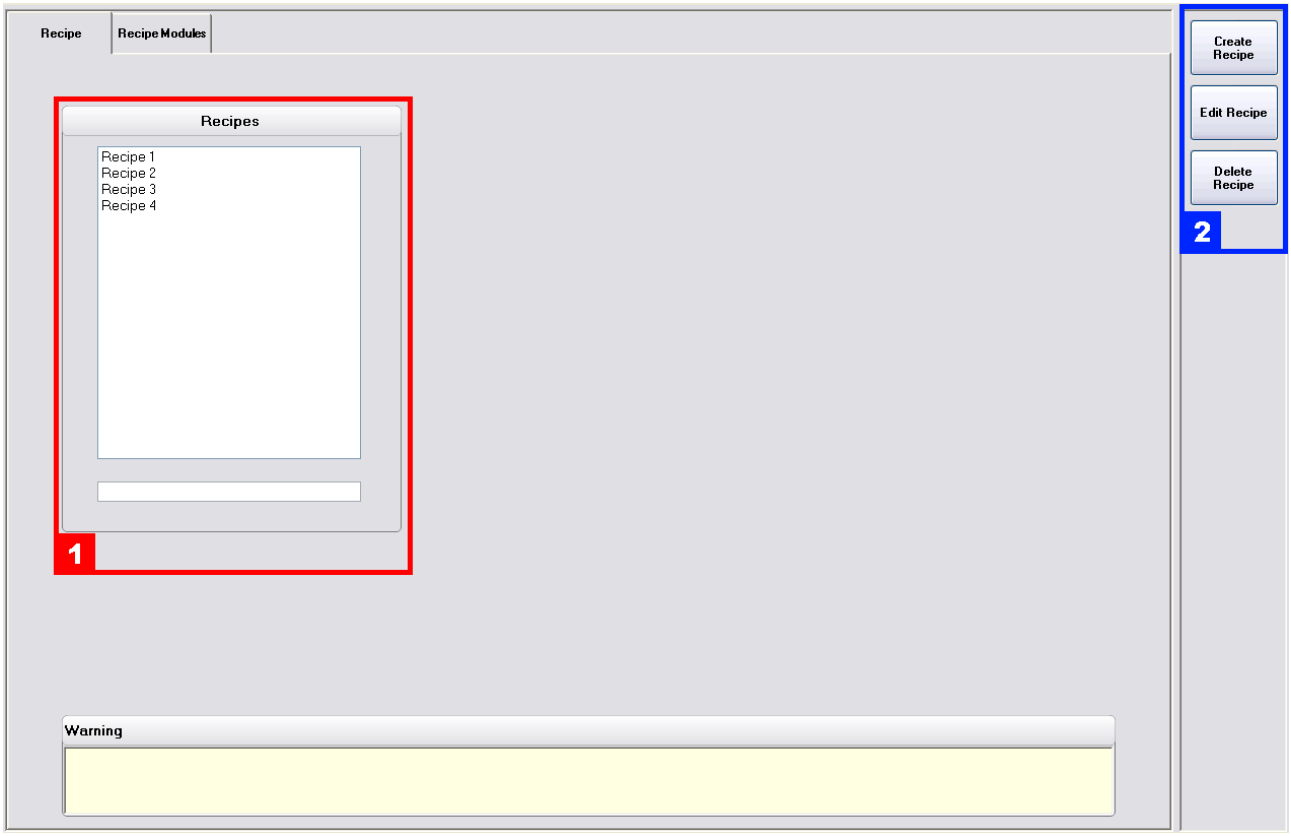
During the execution data are shown with a time window of 1min30s.
When the process is finished (**Process State** in "WAIT_ACK_END"), time scale is refreshed in order to show the entire process period.
When end of process is acknowledged (**Process State** in "IDLE"), all graph are cleared.

6. "RECIPE" MENU

6.1. RECIPE TAB

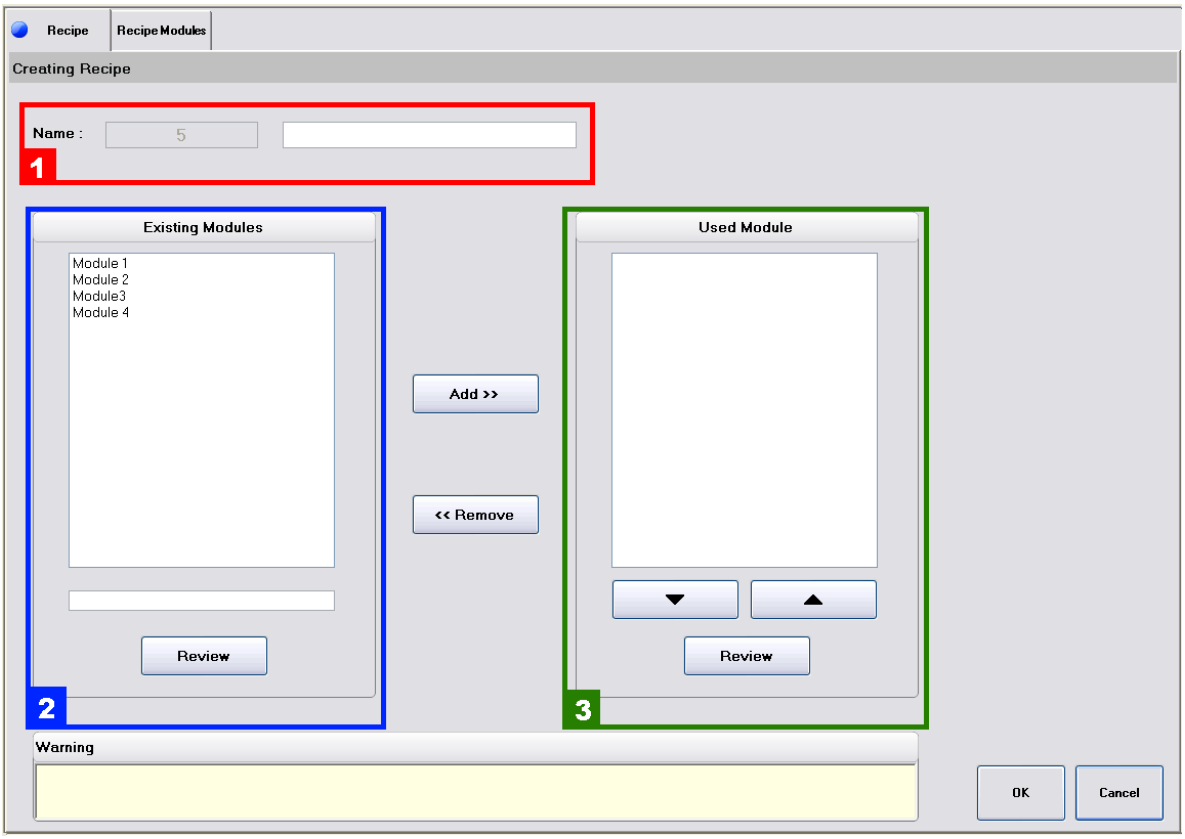
6.1.1. ***PRESENTATION***

Recipe tab lists all existing Recipes inside Recipe area (**1**). Command Panel (**2**) allow to **Create**, **Edit** or **Delete** a Recipe.



6.1.2. ***RECIPE CREATION***

To create a new Recipe **Create Recipe** button must be clicked. Then **Creating Recipe** dialog box is show.



The name of new Recipe can be set in **Name** area (1). Index of Recipes (1 up to 100) is calculated automatically to be compliant with hardware storage.

Existing area (2) contains the list of all existing Modules, a "filter" field and a button **Review**. **Review** button can be used to review parameters of an existing Module as shown in §5.1.2 Create job.

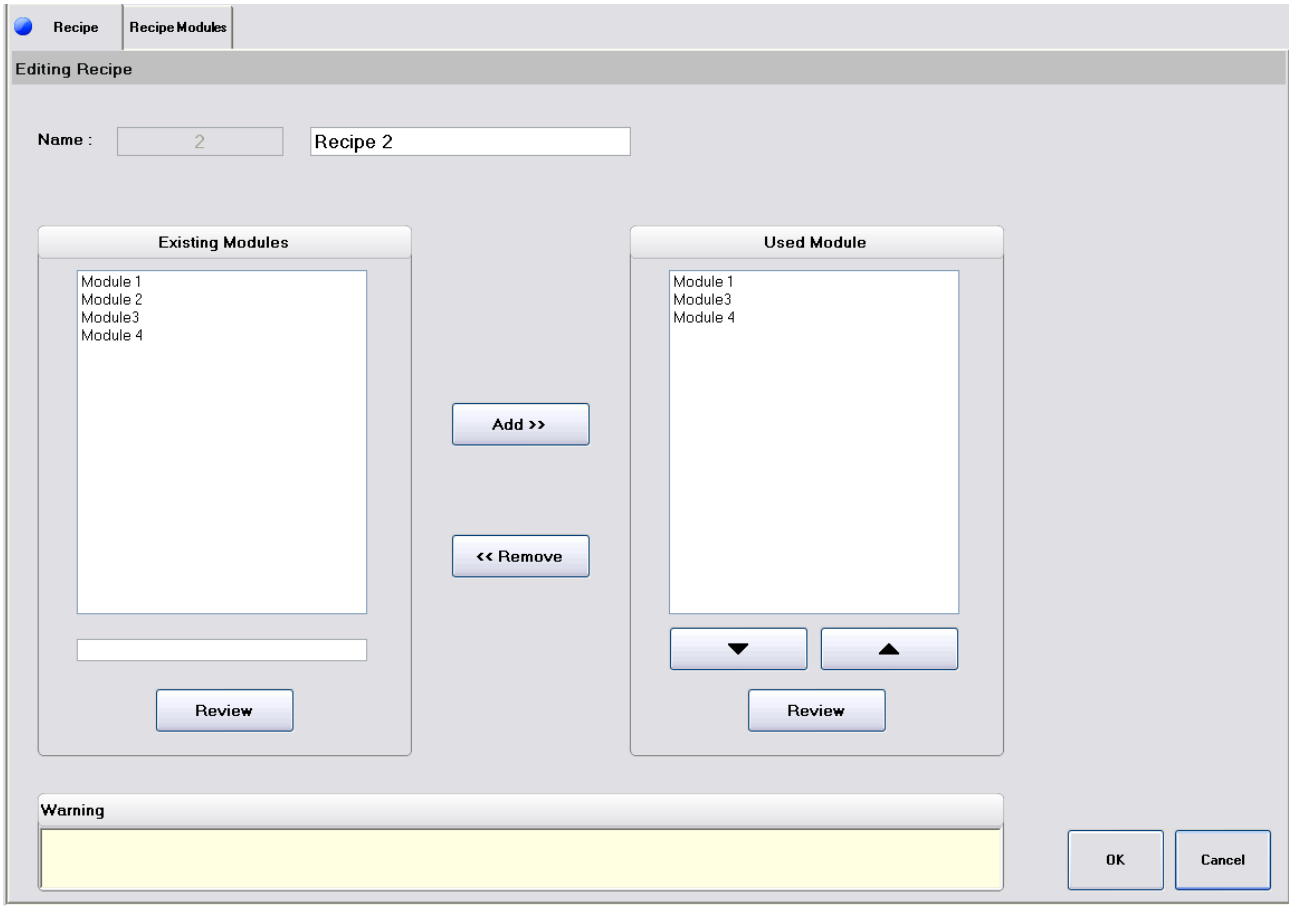
To configure your Recipe select an existing Module and click on **Add** or **Delete** button as you wish.

Modules that will be used in the Recipe are displayed in **Used** area (3). This area contains also three buttons, **Up**, **Down** and **Review**. **Up** and **Down** buttons (arrows) can be used to change the sequence of used Modules. **Review** button have the same behaviour than the one in **Existing** area.

When configuration of Recipe is done, click on **OK** button to save it inside PLC memory, or **Cancel** button to abort the creation. Information panel will be shown with an updated Recipe list.

6.1.3. ***RECIPE EDITION***

To edit an existing Recipe, select one in Recipe tab and click on **Edit Recipe** button. Then **Editing Recipe** dialog box is show.



This dialog box is similar to **Creating recipe** dialog box (see §6.1.2 Recipe creation), but contains parameters of the edited Recipe. You can modify Recipe's configuration as describe for **Creating Recipe** dialog box.

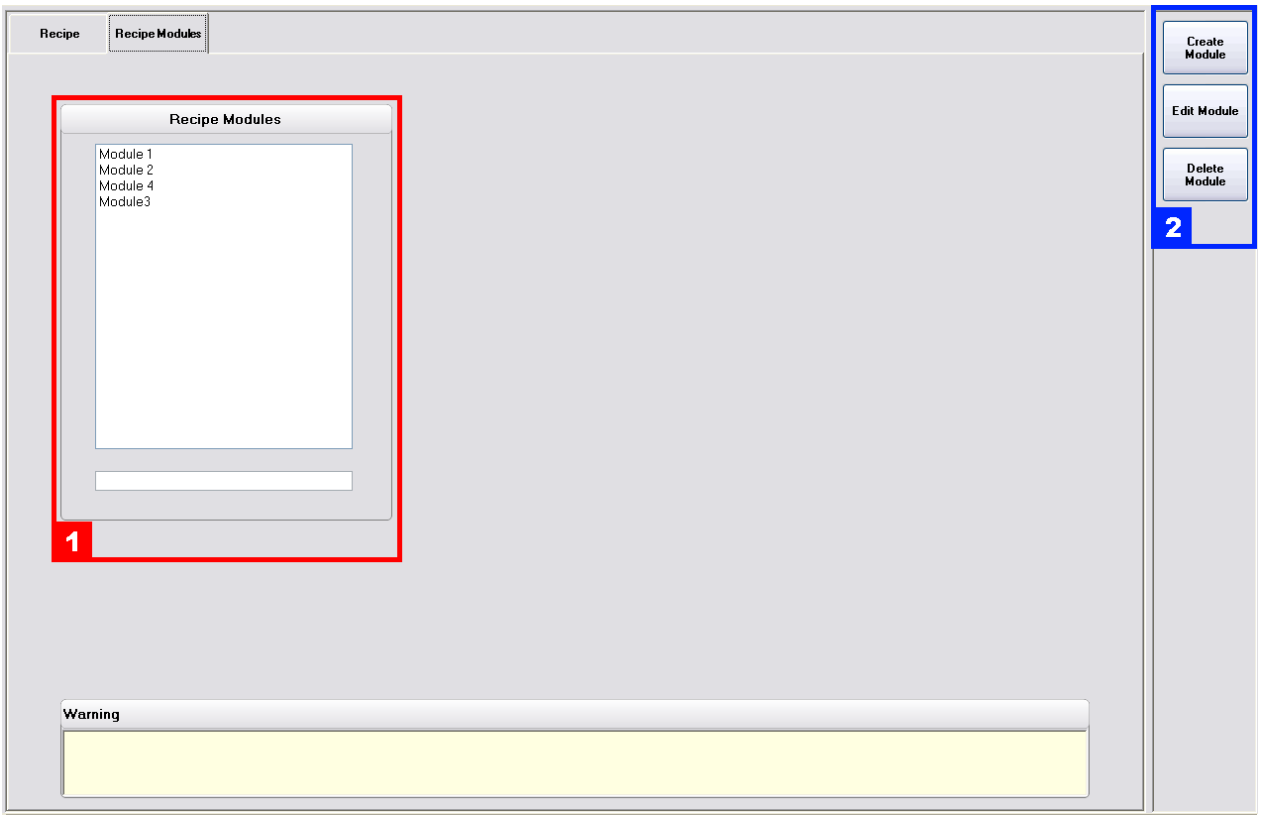
Change the Recipe name to an unused name will rename the Recipe.

When configuration of Recipe is done, click on **OK** button to save it inside PLC memory, or **Cancel** button to abort the creation. Information panel will be shown with an updated Recipe list.

6.2. RECIPE MODULES TAB

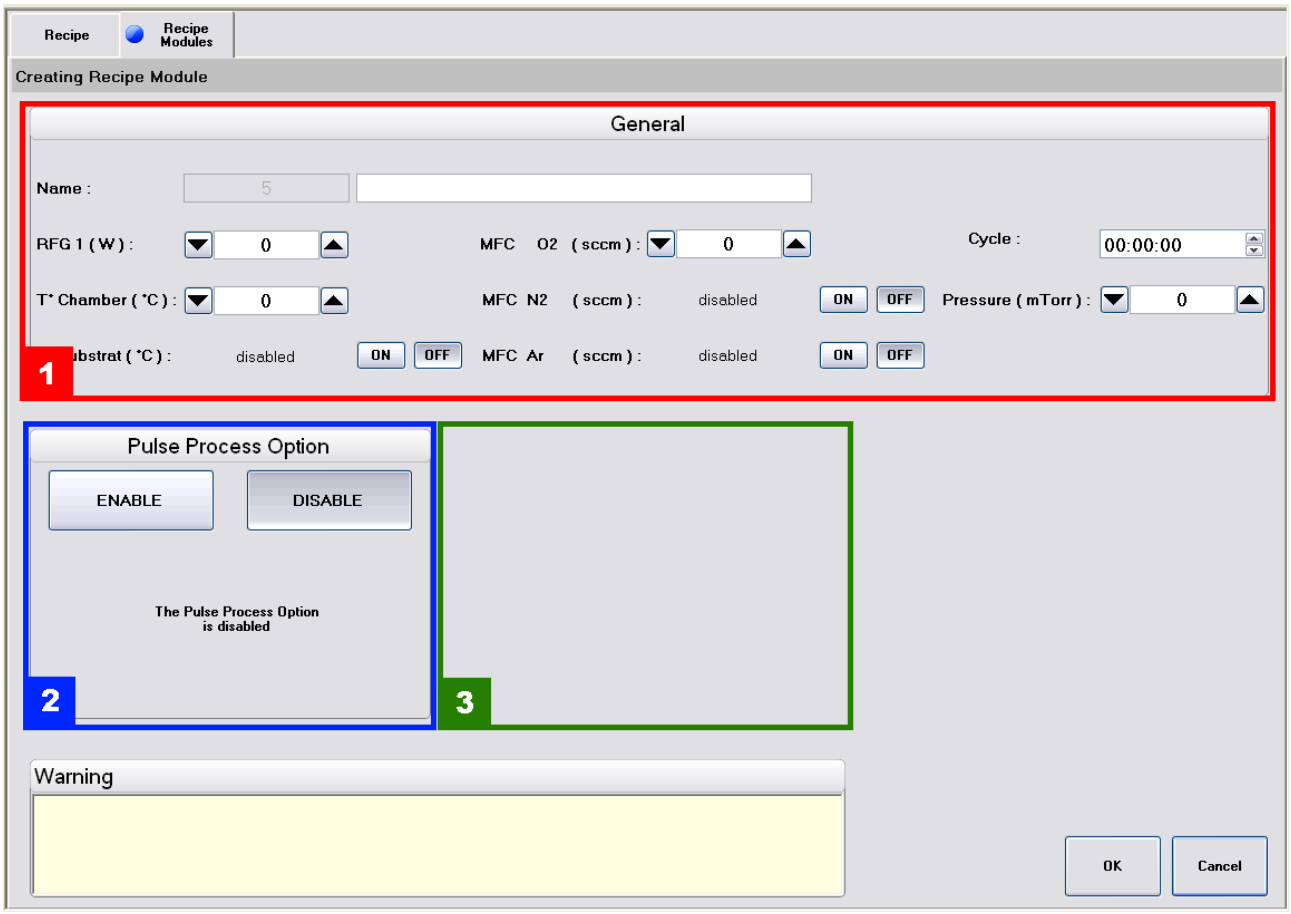
6.2.1. ***PRESENTATION***

Modules tab lists all existing Modules inside Module area (**1**). Command Panel (**2**) allow to **Create, Delete** or **Edit** a Module.

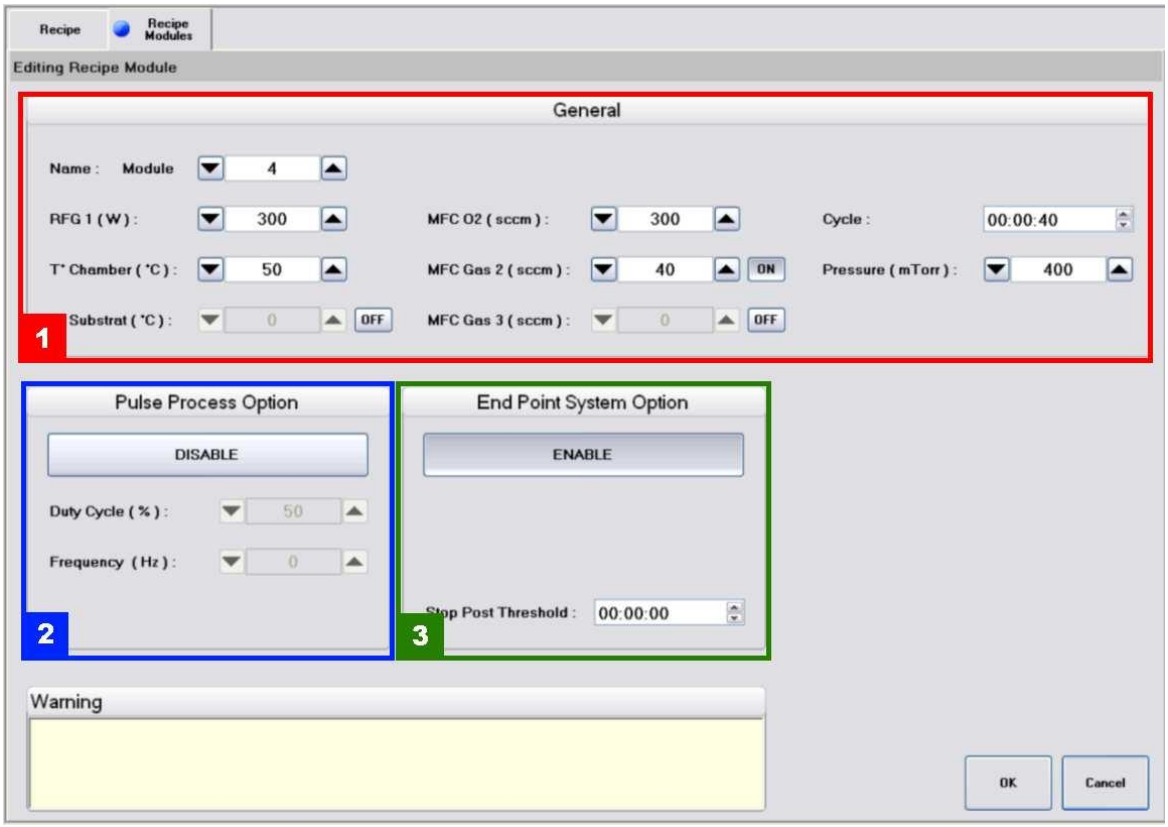


6.2.2. ***MODULE CREATION***

To create a new Module **Create Module** button must be clicked. Then **Creating Module** dialog box is show.

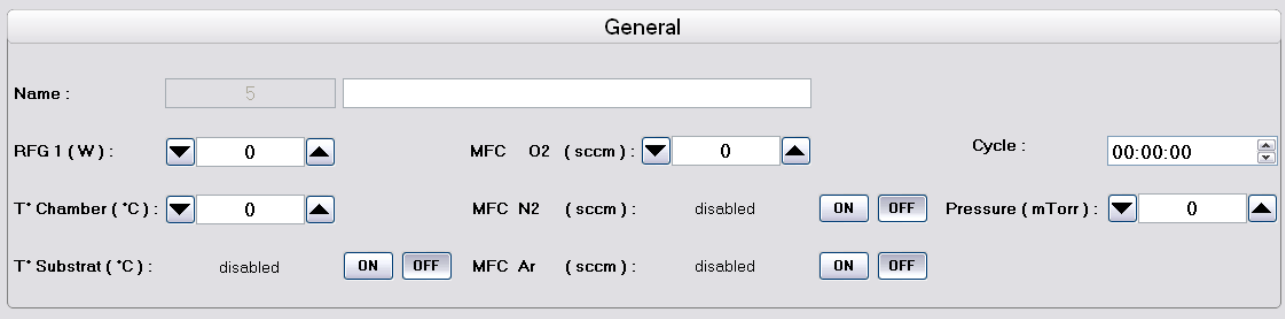


6.2.2.1. *END POINT SYSTEM PHOTO DIODE*



This dialog box is composed of three parts that are described below. **General** area (1) is used to configure general parameters of Module. **Pulse Process Option** area (2) allow operator to configure RF generator's pulse functionality. **End Point System Option** area (3) allow operator to configure either photodiode, either spectrometer functionality. These two areas are optional and may be not displayed if those functionalities are not installed on device.

6.2.2.2. GENERAL



This area contains the most principal Module's parameters.

The name of new Module can be set in **Name** field. Indexes of Module (1 up to 100) are fixed and defined automatically by the system. To create new Module, enter an unused name.

Power of RF generator can be set in **RFG 1** field. Its unit is Watt and it could be set from 0 to the max power generator configured in Setup menu, Process Constant tab (see §8.1 Process constants tab).

Chamber's temperature is configured in **T° Chamber** field. The unit is Celsius degree.

Substrate's temperature is configured in **T° Substrate** field. The unit is Celsius degree. This parameter can be enabled or disabled by clicking on right side button. When substrate warm is disabled, the value is forced to 0.

Oxygen gas flow can be set in **MFC O2** field. Its unit is Standard Cubic Centimeters per Minute.

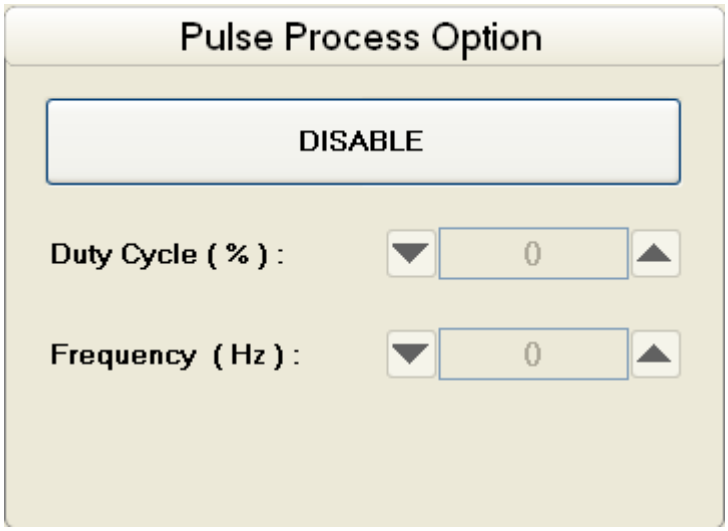
Secondary gas flow is configured in **MFC Gas 2** field. It has the same unit than oxygen gas flow. This parameter also can be enabled or disabled by clicking on right side button. When disabled, the value is forced to 0. The secondary gas used during process is configured in Setup menu (see §8.1 Process constants tab).

Third gas flow is configured in **MFC Gas 3** field. Its configuration behaviour is same as secondary gas flow.

Plasma duration is configured in **Cycle** field. Format of time is HH:mm:ss. If spectrometer option is enabled, this field is disabled and grayed; the end of process will be determined by spectrometer.

Pressure inside process chamber can be set in **Pressure** field. Its unit is milliTorr, configuration's range is 0 up to the maximum baratron range configured in Setup menu (see §8.1 Process constants tab).

6.2.2.3. PULSE PROCESS OPTION



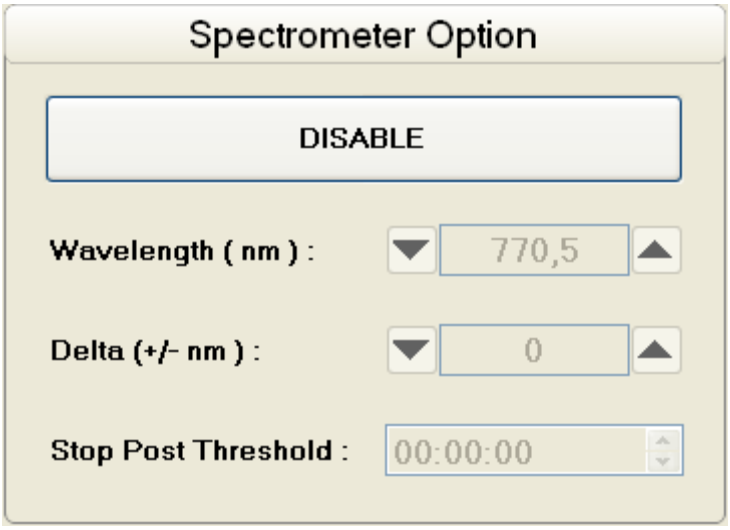
Pulse Process option can be enable in the Module by clicking on **DISABLE** button. When this button is clicked its text changes to **ENABLE** and other controls are enable. The option will be taken into account during execution of the Module.

Duty Cycle field is used to configure the duty cycle of the pulse. It is configured in percent.

Frequency field configure the frequency, in Hertz, of the pulse.

6.2.2.4. END POINT SYSTEM OPTION

6.2.2.4.1. SPECTROMETER OPTION



Spectrometer option can be enable in the Module by clicking on **DISABLE** button. When this button is clicked its text changes to **ENABLE** and other controls are enable. The option will be

taken into account during execution of the Module. When this option is enabled, the end of process is determined by the spectrometer and the cycle duration are not taken into account (its parameter field, see §6.2.2.2 General, is disabled).

Wavelength field is used to configure the wavelength to be scanned by spectrometer. Its unit is nanometer.

Delta field configures the range of wavelength before and after principal wavelength that will be scanned by spectrometer. It is also configured in nanometer unit.

Stop Post Threshold field configures an amount of time to wait before stopping process when the end of process was detected by spectrometer. Format of time is HH:mm:ss.

6.2.2.4.2. PHOTO DIODE OPTION

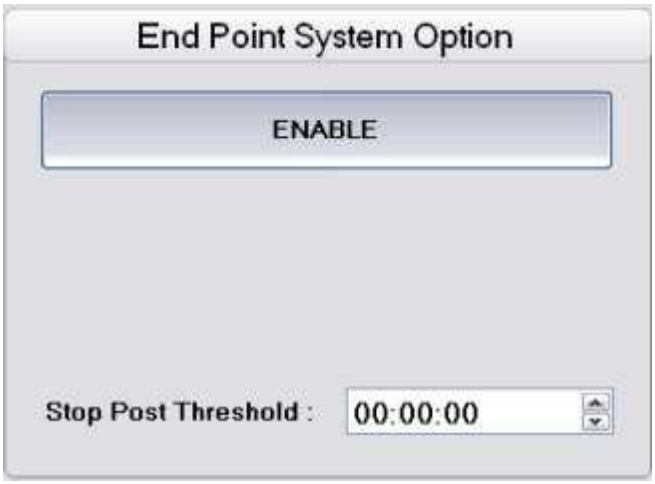
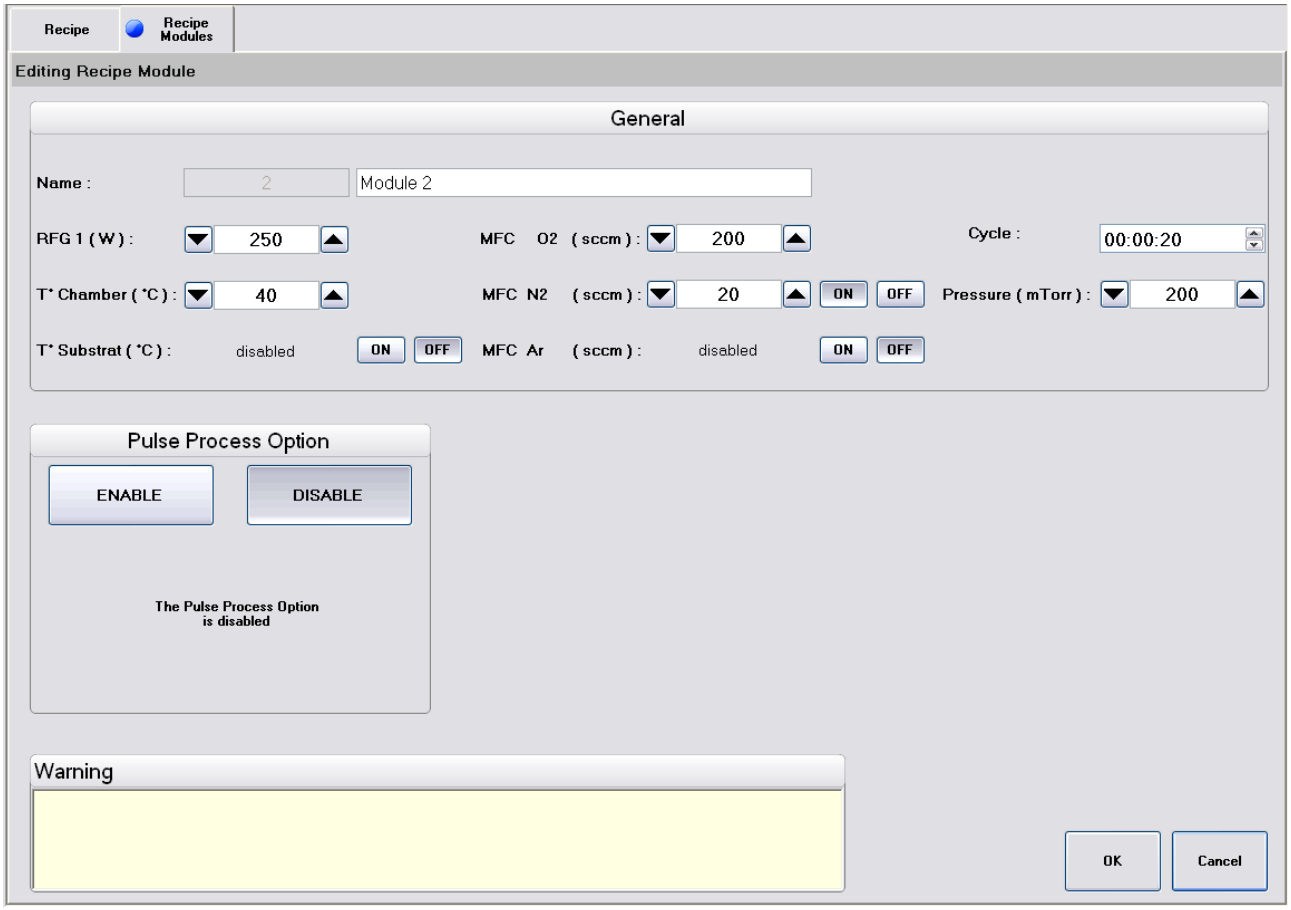


Photo Diode option can be enable in the Module by clicking on **DISABLE** button. When this button is clicked its text changes to **ENABLE** and other controls are enable. The option will be taken into account during execution of the Module. When this option is enabled, the end of process is determined by the photo diode and the cycle duration are not taken into account (its parameter field, see §6.2.2.2 General, is disabled).

Stop Post Threshold field configures an amount of time to wait before stopping process when the end of process was detected by photo diode. Format of time is HH:mm:ss.

6.2.3. ***MODULE EDITION***

To edit an existing Module, select one in Module tab and click on **Edit Module** button. Then **Editing Module** dialog box is show.



This dialog box is similar to **Creating Module** dialog box (see §6.2.3 Module Edition), but contains parameters of the edited Module. You can modify Module's configuration as describe for **Creating Module** dialog box.

Change the Module name (here 1) to an unused name will rename the Module.

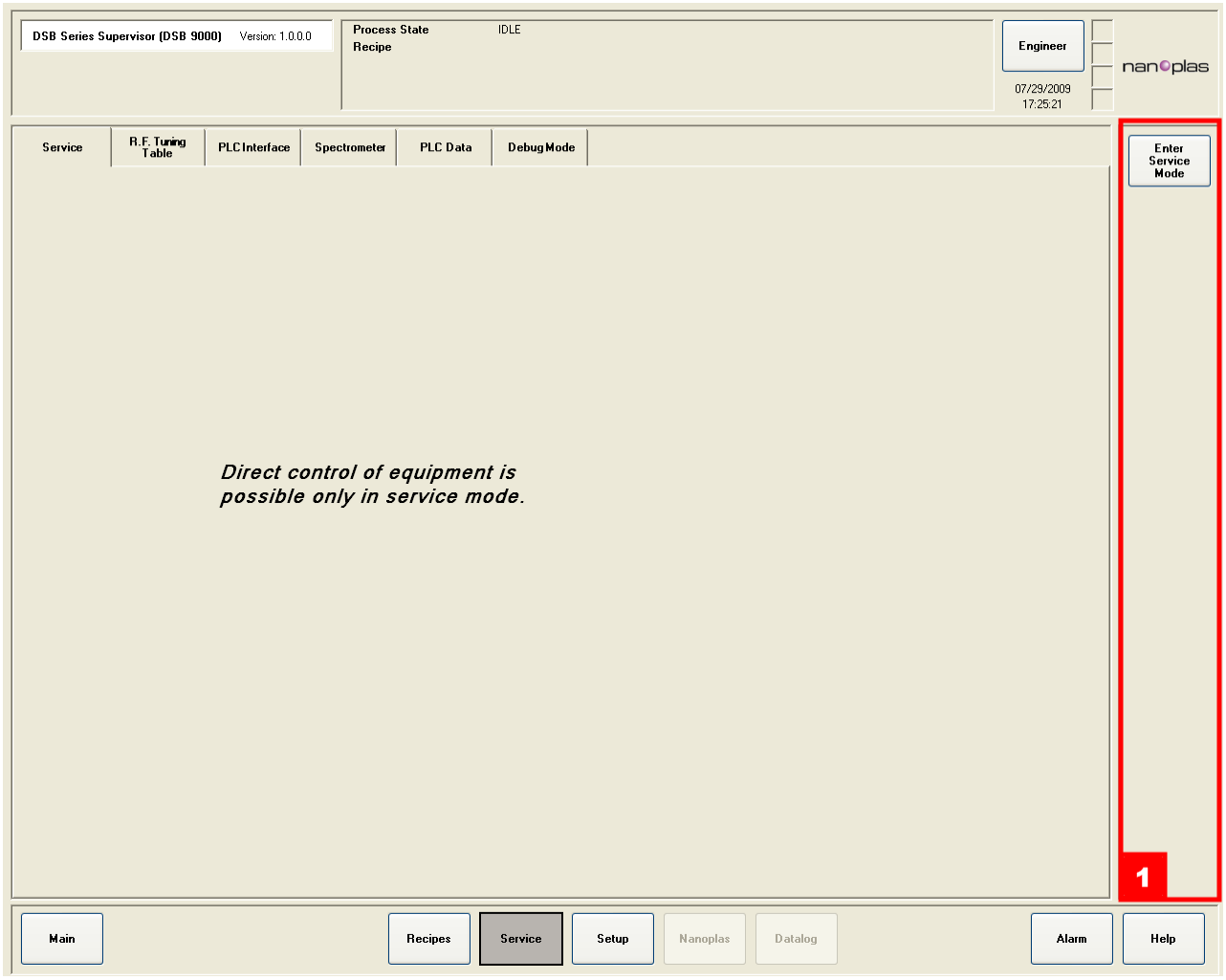
When configuration of Module is done, click on **OK** button to save it inside PLC memory, or **Cancel** button to abort the creation. Information panel will be shown with an updated Module list.

7. "SERVICE" MENU

7.1. SERVICE TAB

7.1.1. ***PRESENTATION***

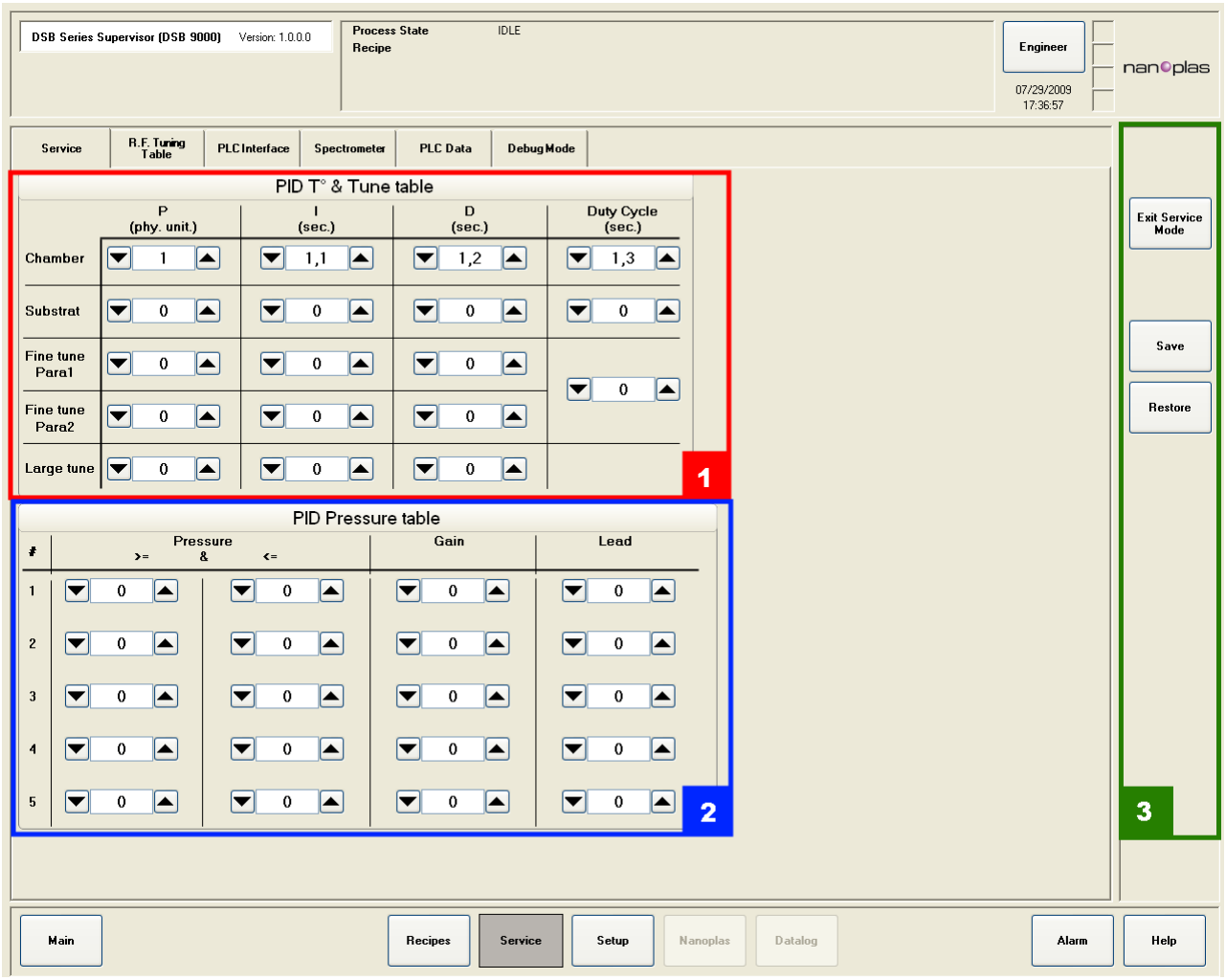
Service tab allows an advanced user to setup temperature, tune and pressure PID tables.



In order to go in Service Mode, **Enter Service Mode** button must be clicked (**1**).

7.1.2. ***SERVICE MODE***

After entering Service Mode, the information panel becomes as follow.



PID T° & Tune Table area (1) allows an advanced user to configure temperature and RF generator tune regulation.

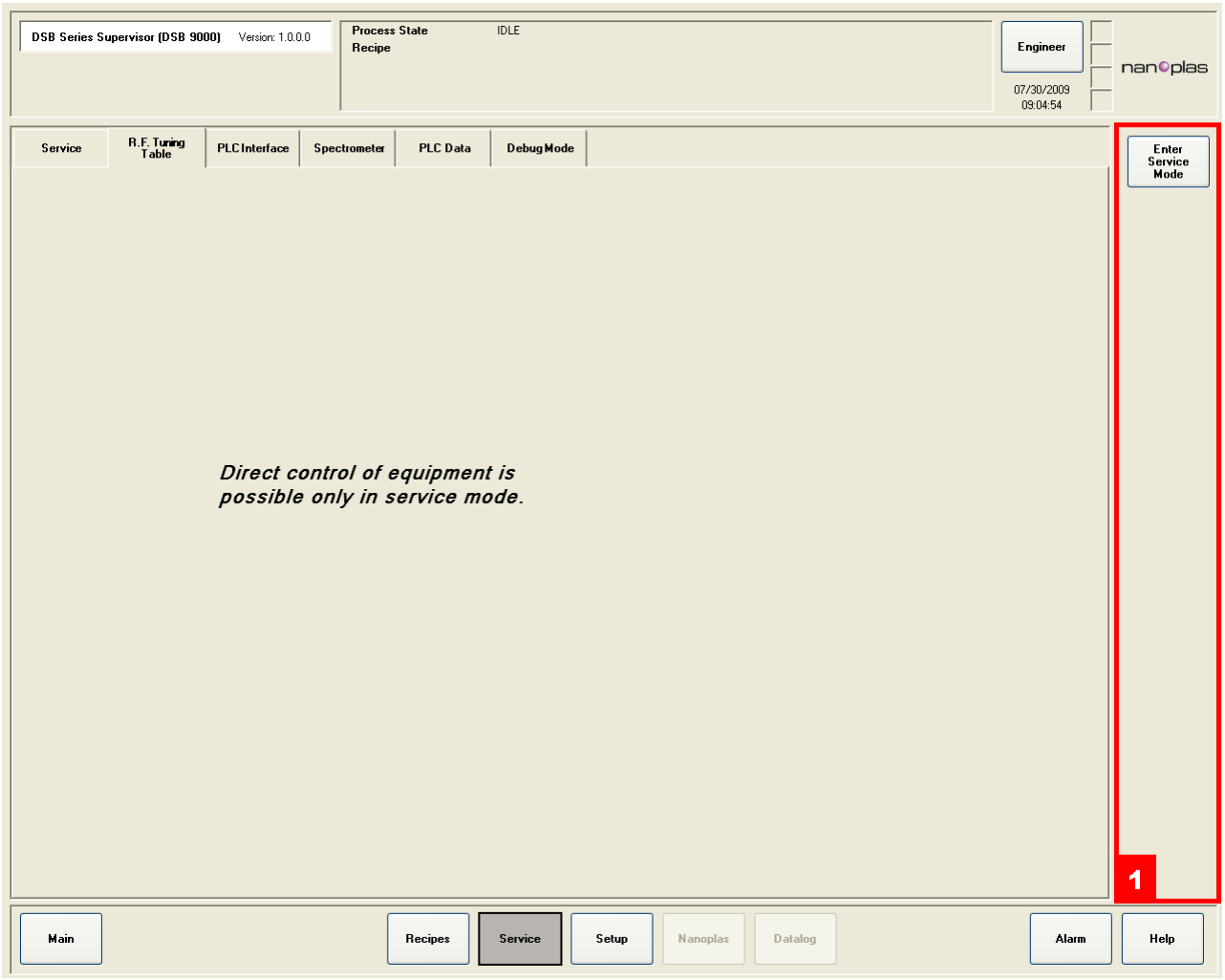
PID Pressure Table area (2) can be used to configure the pressure regulation. This configuration is not used when a throttle valve is installed on device.

Command panel (3) contains three buttons. **Save** button will save the displayed configuration inside PLC memory when it is clicked. **Restore** button load configuration stored inside PLC memory when it is clicked. Finally, click on **Exit Service Mode** to go out of Service Mode.

7.2. RF TUNING TAB

7.2.1. ***PRESENTATION***

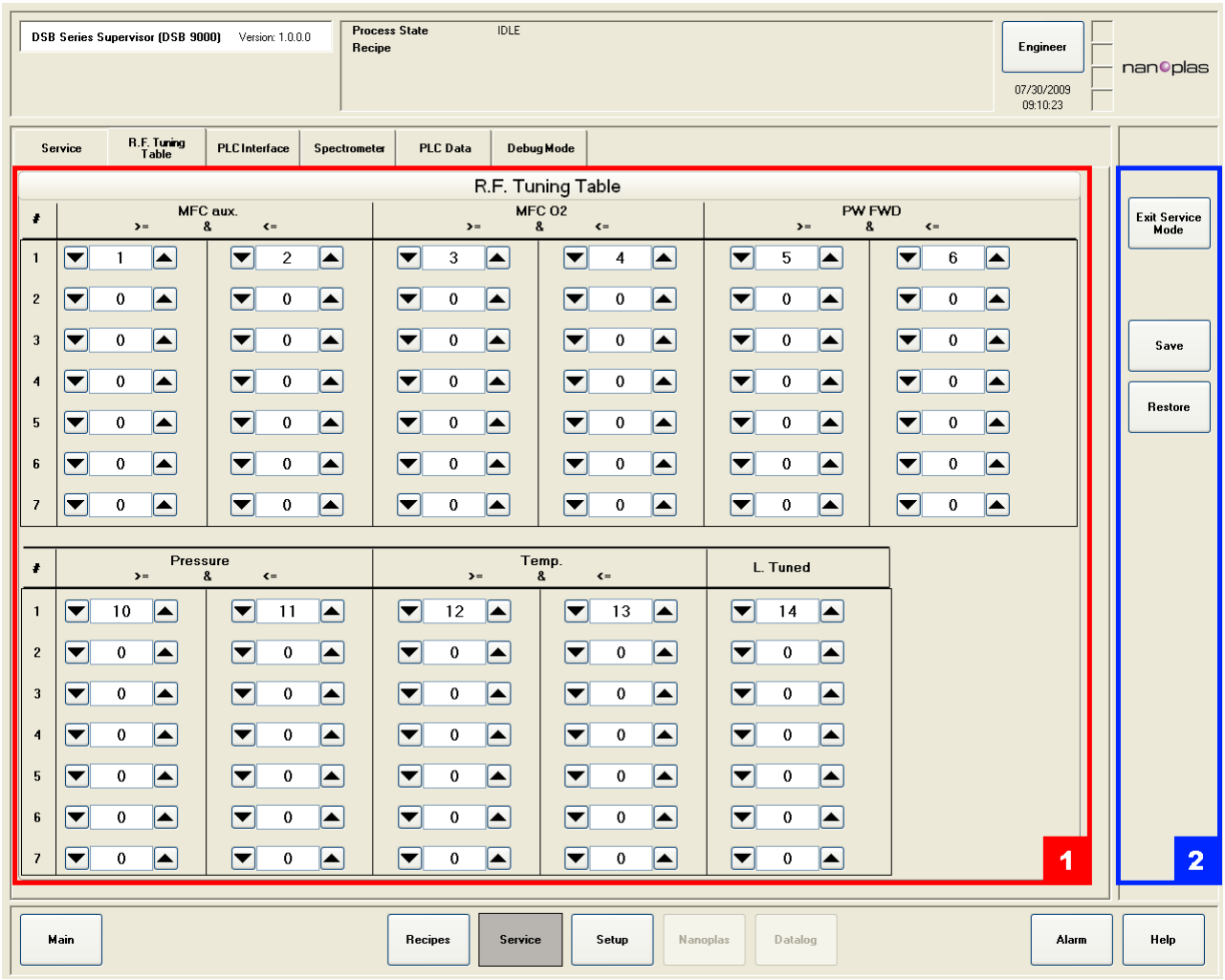
RF Tuning Table tab allow an advanced user to configure values used to RF generator tuning.



To display RF tuning table, **Enter Service Mode** button must be clicked (**1**).

7.2.2. ***SERVICE MODE***

Once Service Mode is entered, information panel becomes as follow.



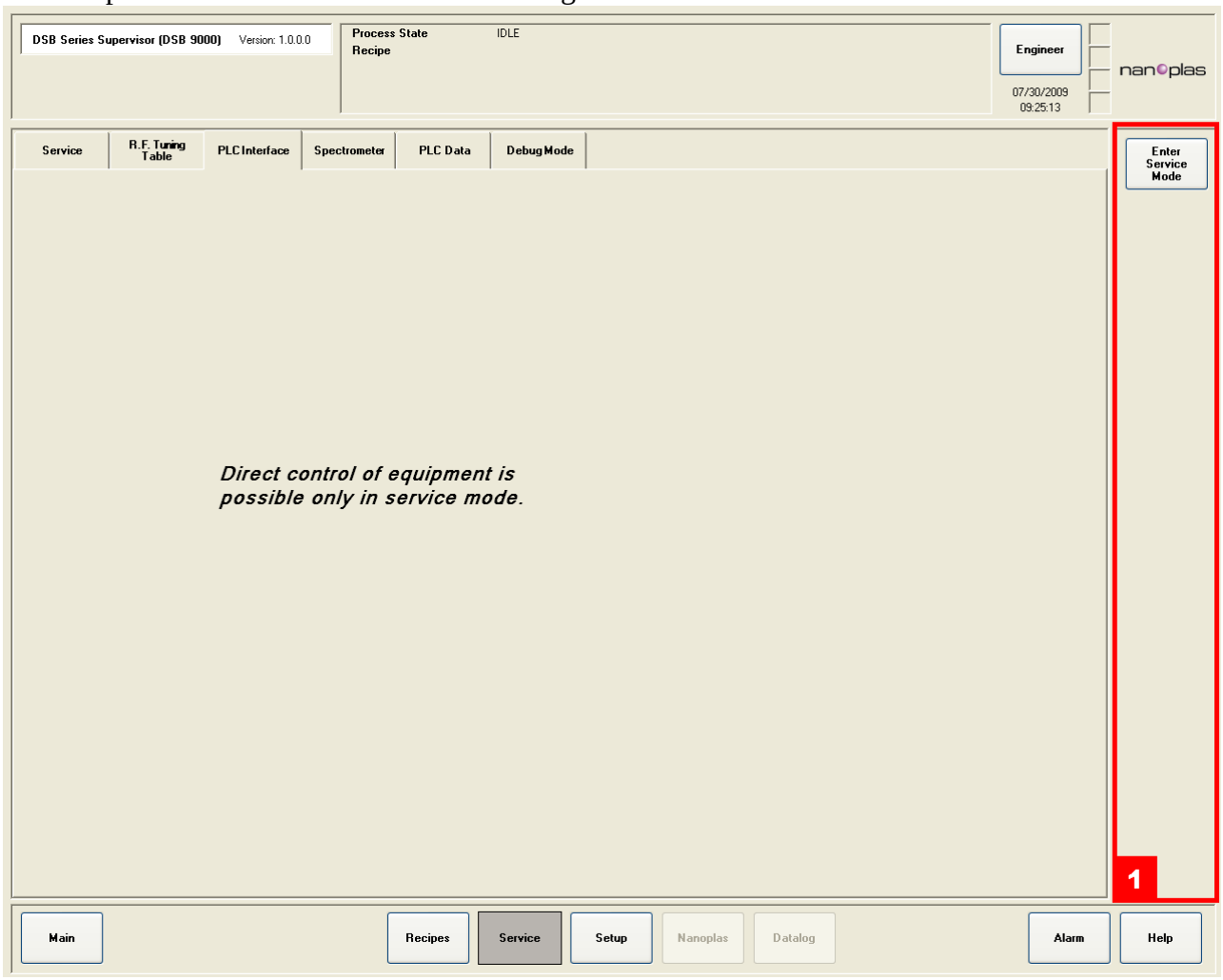
RF Tuning table is located inside area **1**. It represents table configuration used to tune the RF generator during plasma process.

Command panel (**2**) contains three buttons. **Save** button will save the displayed configuration inside PLC memory when it is clicked. **Restore** button load configuration stored inside PLC memory when it is clicked. Finally, click on **Exit Service Mode** to go out of Service Mode.

7.3. PLC INTERFACE TAB

7.3.1. ***PRESENTATION***

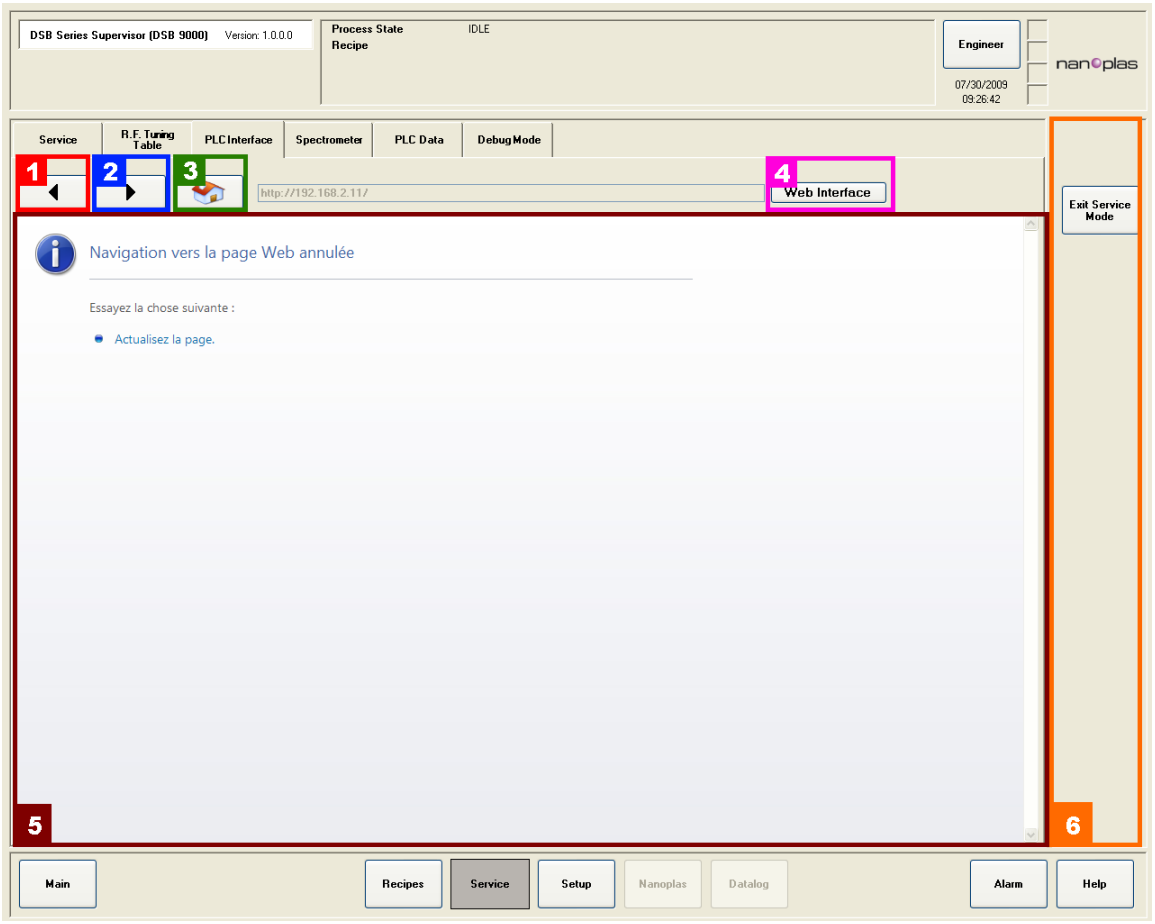
This tab provides a direct access to PLC through its web interface.



To display PLC's web interface, **Enter Service Mode** button must be clicked (**1**).

7.3.2. ***SERVICE MODE***

After entering Service Mode, information panel becomes as follow.



Backward button (1) can be used to go back to previous navigated pages.

Forward button (2) can be used to move forward in previous navigated pages (if **Backward** button was clicked).

Home button (3) navigates to the home page of PLC's web interface.

Protocol button (4) allows the user to switch between HTTP and FTP protocols. If **Web Interface** is displayed, the HTTP protocol is used and operator can controls the PLC directly by viewing its GUI. If **Data Access** is displayed, FTP protocol is used and operator can access to process data files stored inside PLC's memory card.

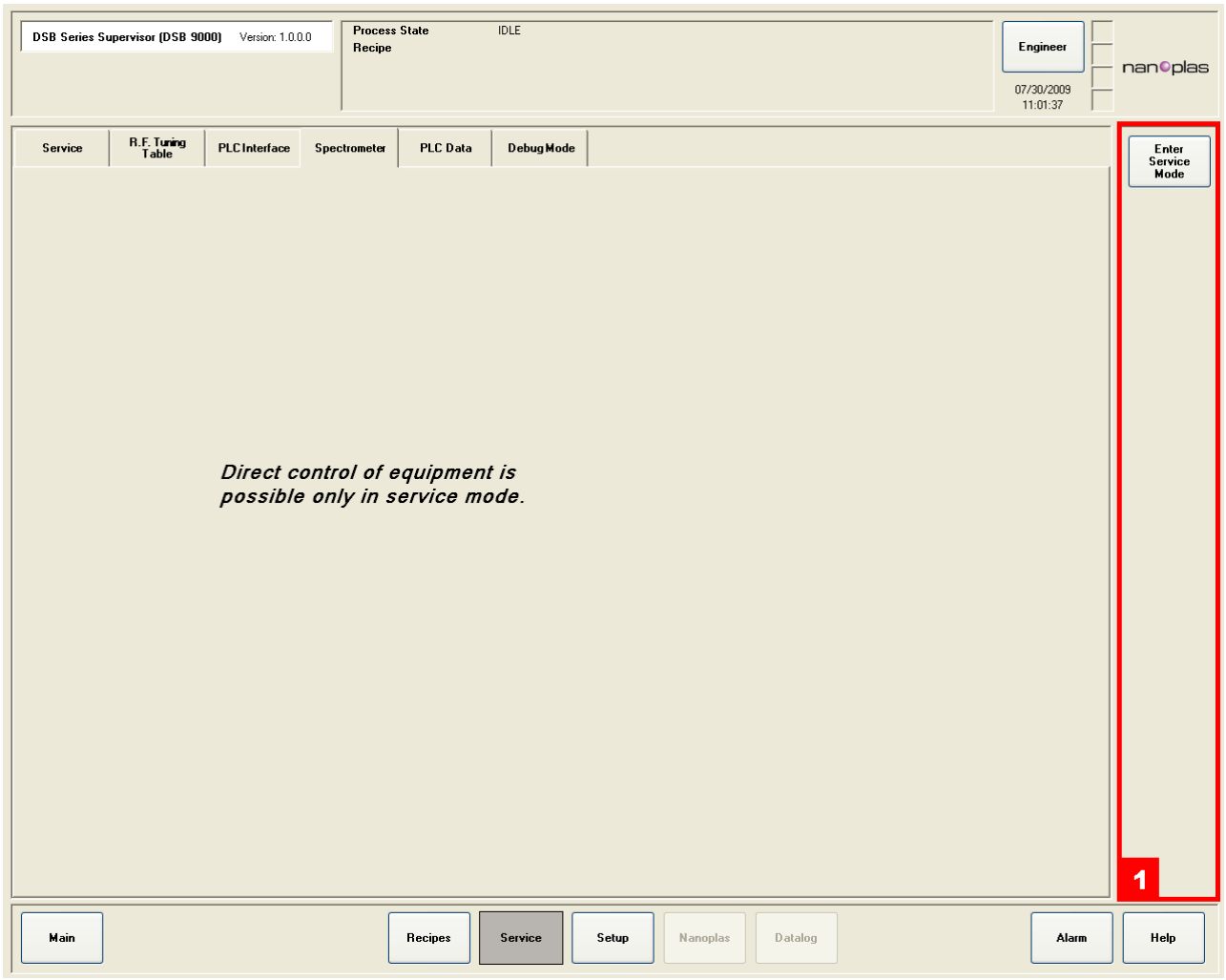
Web browser area (5) displays the web interface of current navigated page.

Command panel (6) contains **Exit Service Mode** button. Click this button to exit Service Mode.

7.4. END POINT DETECTOR TAB TAB

7.4.1. ***PRESENTATION***

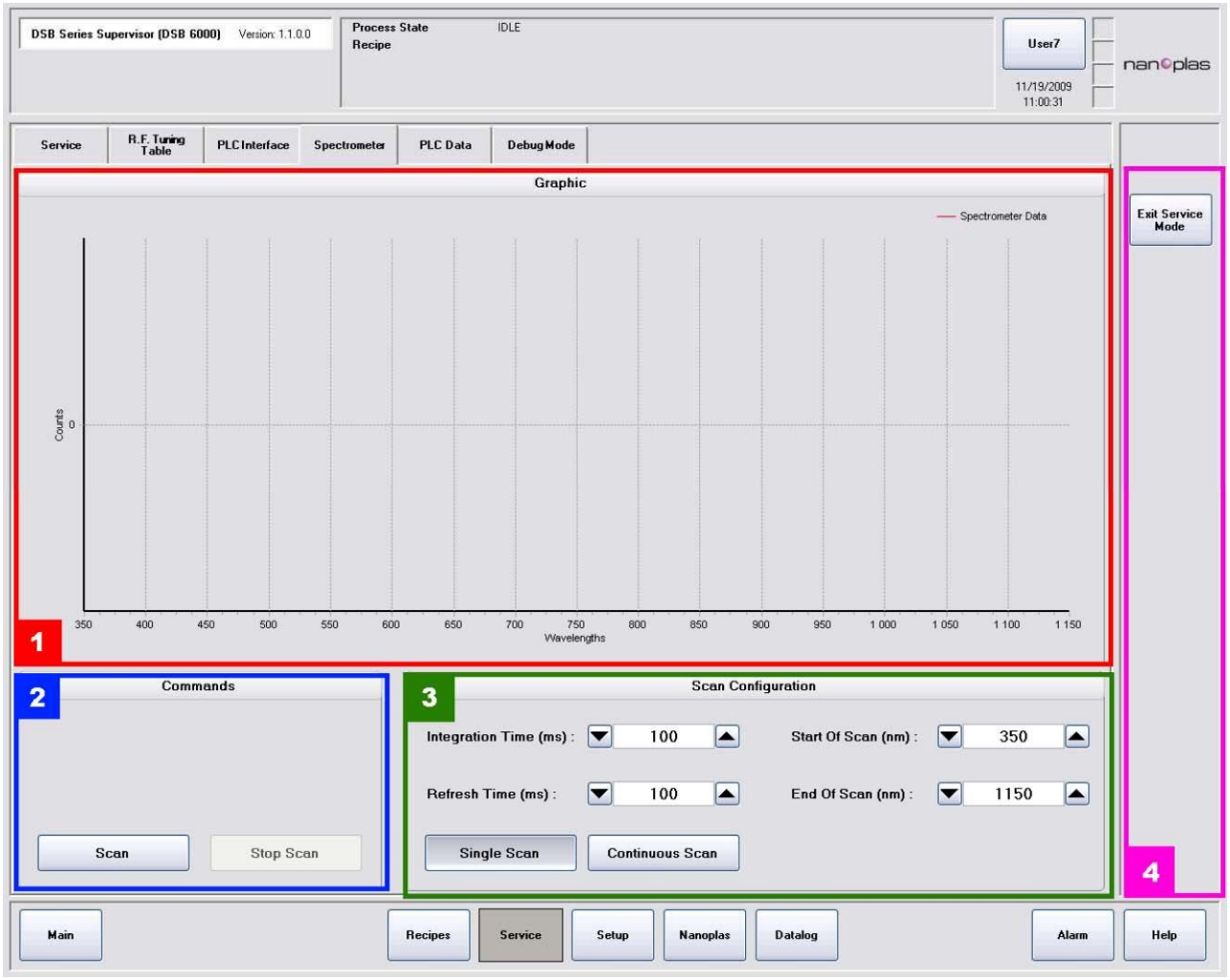
This tab depends on End point system enabled. It allows an advanced user to control independently the spectrometer or the photo diode.



To display spectrometer panel, **Enter Service Mode** button must be clicked (**1**).

7.4.2. ***SPECTROMETER SERVICE MODE***

Once Service Mode is entered, information panel becomes as follow.



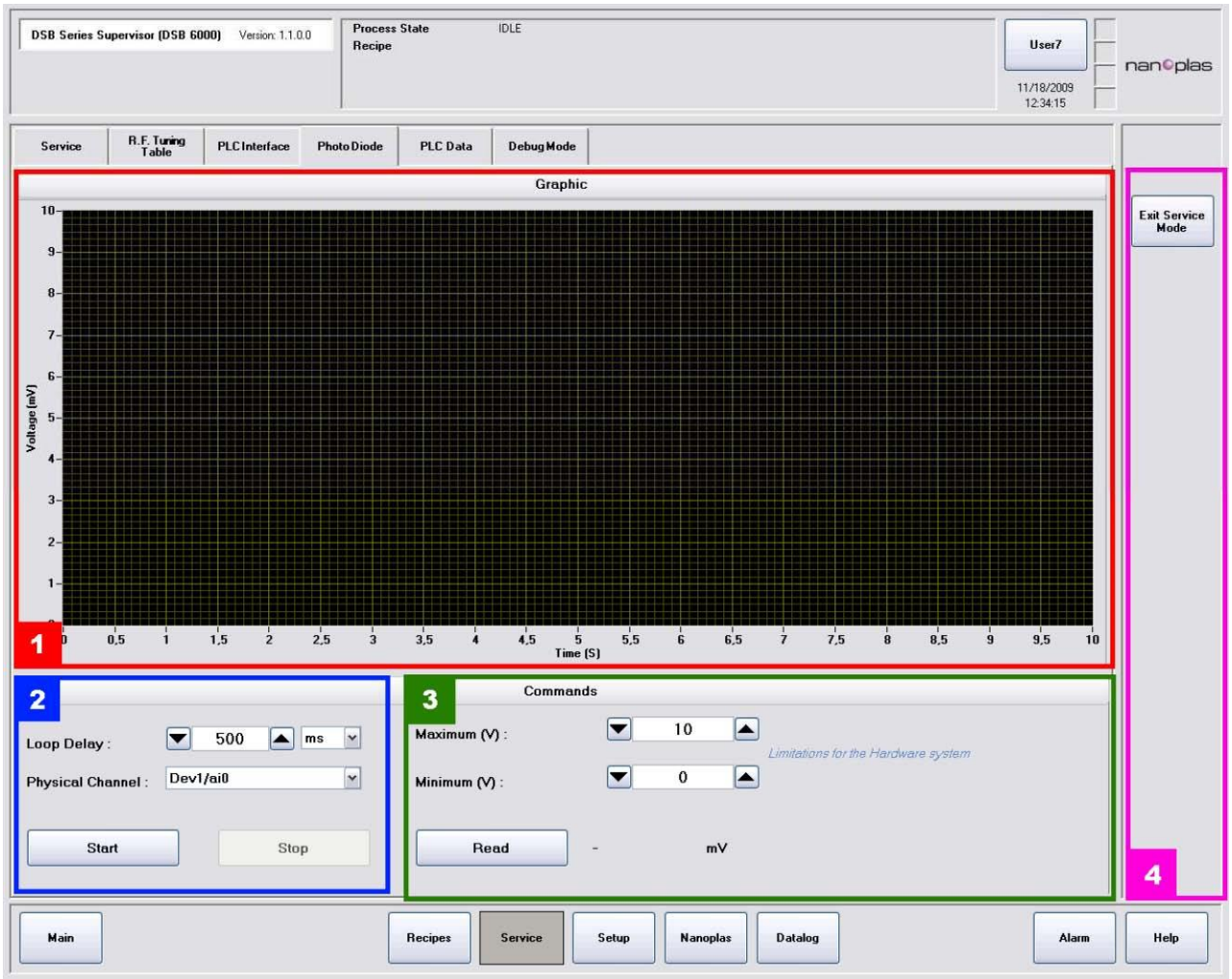
Graphic area (1) displays results of spectrometer's scan. X axe's unit can be Wavelength during a single scan or Time during a continuous scan.

Command area (2) contains some buttons to command spectrometer's scan. **Scan** button start a scan and Stop Scan stop a scan (only for continuous scan).

Scan Configuration area (3) allows an advanced user to configure a scan. When **Single Scan** is checked **Graphic** area displays result of wavelength scan in the range [**Start Of Scan - End Of Scan**]. When **Continuous Scan** is checked spectrometer performs multiple scan at the **Refresh Rate** period until **Stop Scan** is clicked. In **Continuous Scan** mode only the **Start Of Scan** wavelength is scanned.

7.4.1. *PHOTO DIODE SERVICE MODE*

Once Service Mode is entered, information panel becomes as follow.



Graphic area (1) displays results of photo diode's scan. X axe's unit is Voltage measurement done during a single read or during a continuous read.

Area (2) configures a continuous read. **Start** button starts reading at the **Loop Delay** period on **Physical Channel** and **Stop** stops it.

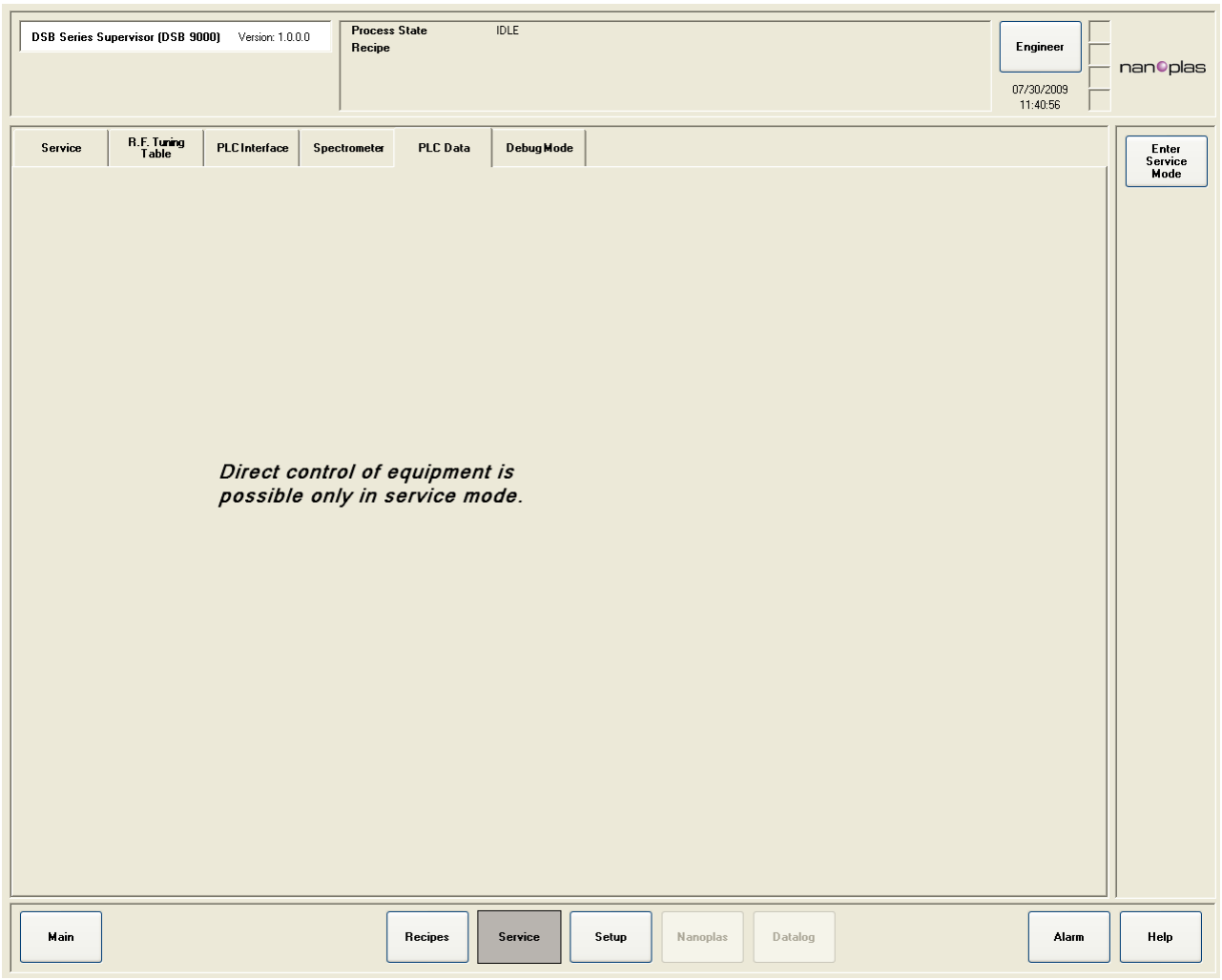
Area (3) allows an advanced user to configure a range of Voltage allowed on Hardware device. These parameters are taken into account only in the Service mode panel. **Read** button read one value and displays it on its right.

Command panel (4) contains **Exit Service Mode** button. Click on it to go out of Service Mode.

7.5. PLC DATA TAB

7.5.1. ***PRESENTATION***

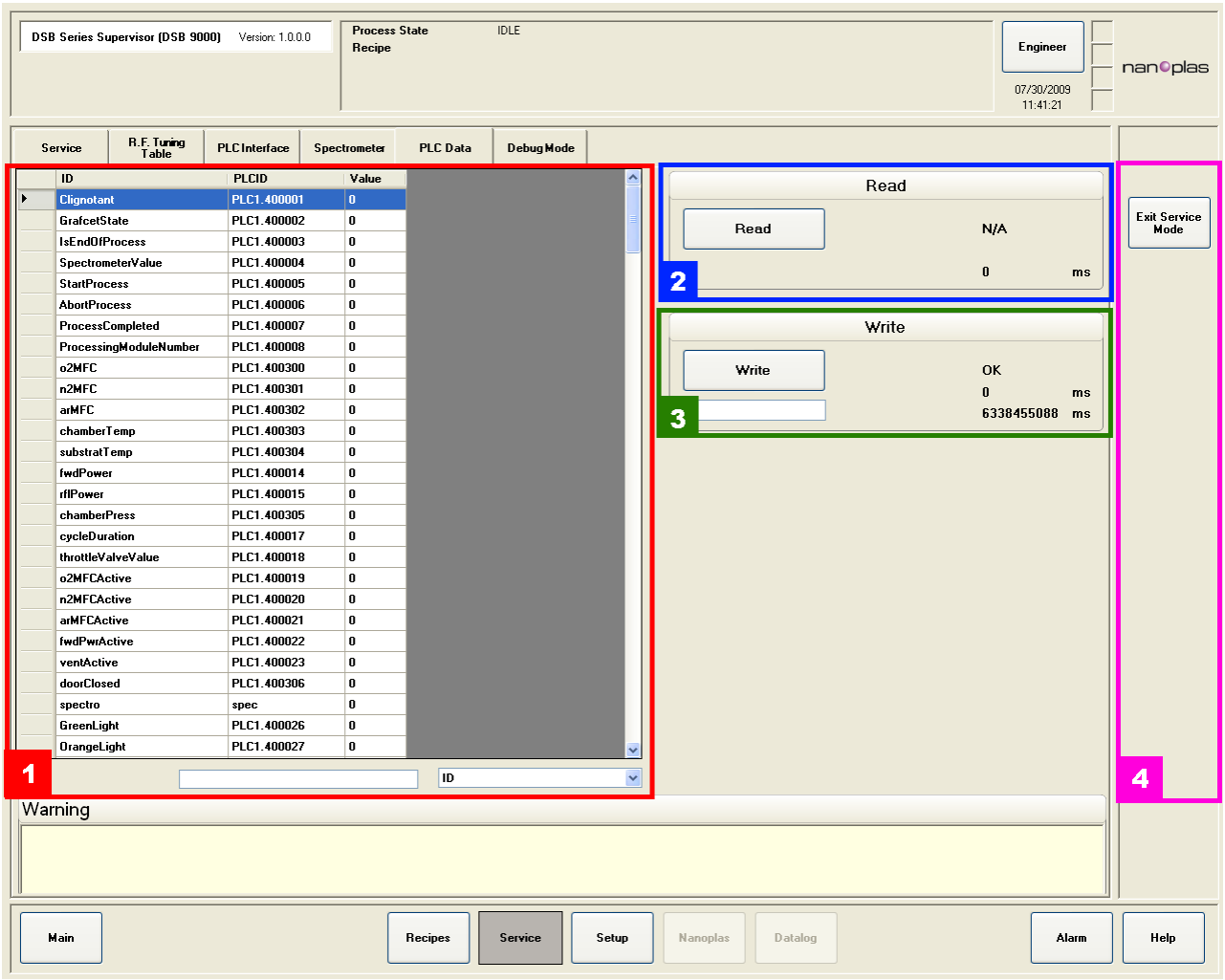
This tab allows an advanced user to view and modify independently each used items with PLC communication.



To display PLC's data, **Enter Service Mode** button must be clicked (**1**).

7.5.2. ***SERVICE MODE***

When Enter Service Mode button is clicked, information panel becomes as follow.



Data area (1) contains the list of used items with PLC communication. The list displays the name of item used inside software, PLC communication and value of the item. This area also contains a filter text box to limit displayed items to those that correspond to text typed and a selection field to determine to which column the filter is applied (ID or PLCID).

Read area (2) contains **Read** button to read the selected item and some information text about the quality of reading and the reading time.

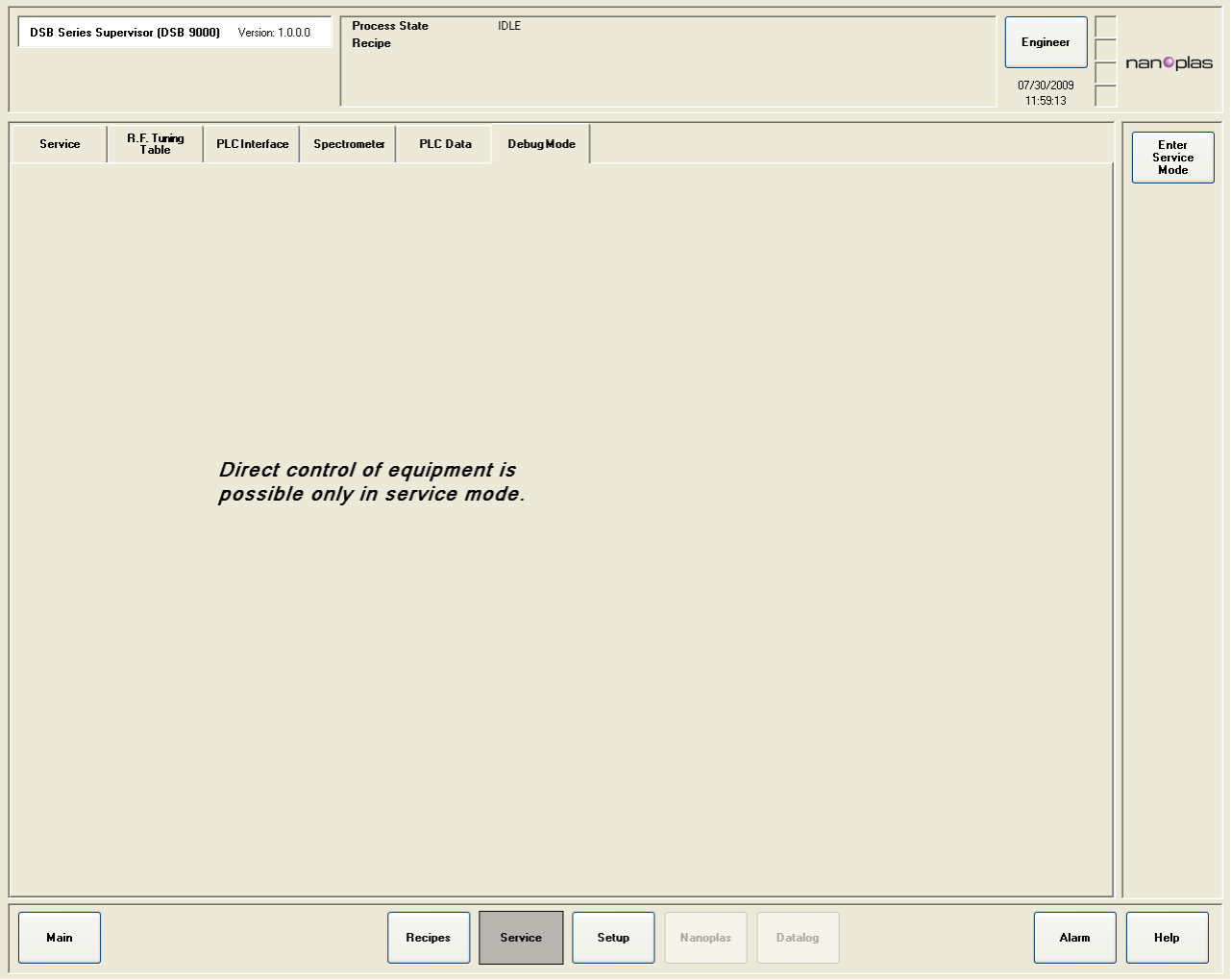
Write area (3) contains **Write** button to write the value typed in field below inside the selected item. It contains also some information about the quality of write and writing time.

Command panel (4) contains **Exit Service Mode** button. Click on it to go out of Service Mode.

7.6. DEBUG MODE TAB

7.6.1. ***PRESENTATION***

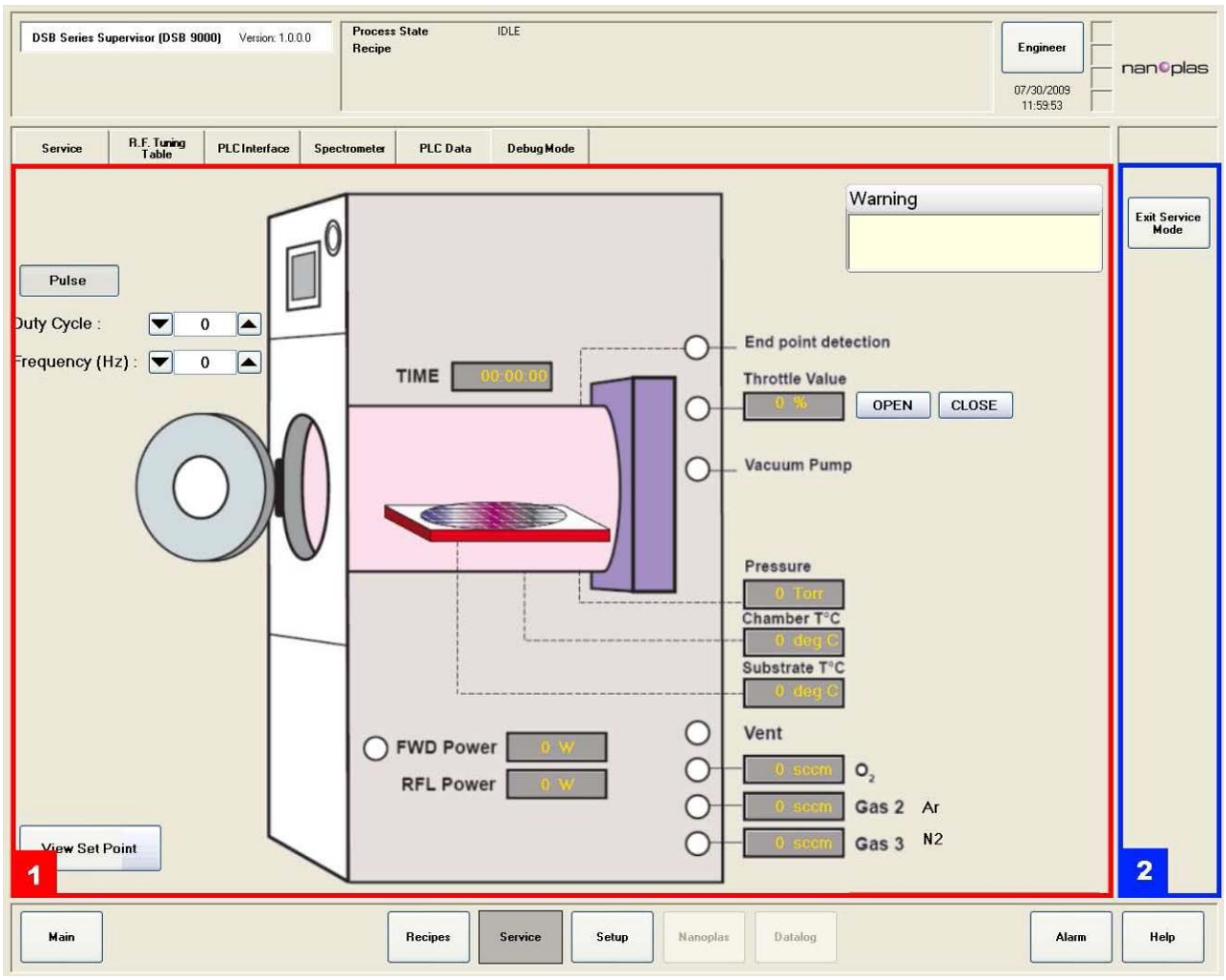
This tab allows an advanced user to command independently each components of DSB device.



To display debug mode, **Enter Service Mode** button must be clicked (**1**).

7.6.2. ***SERVICE MODE***

After entering Service Mode, information panel becomes as follow.

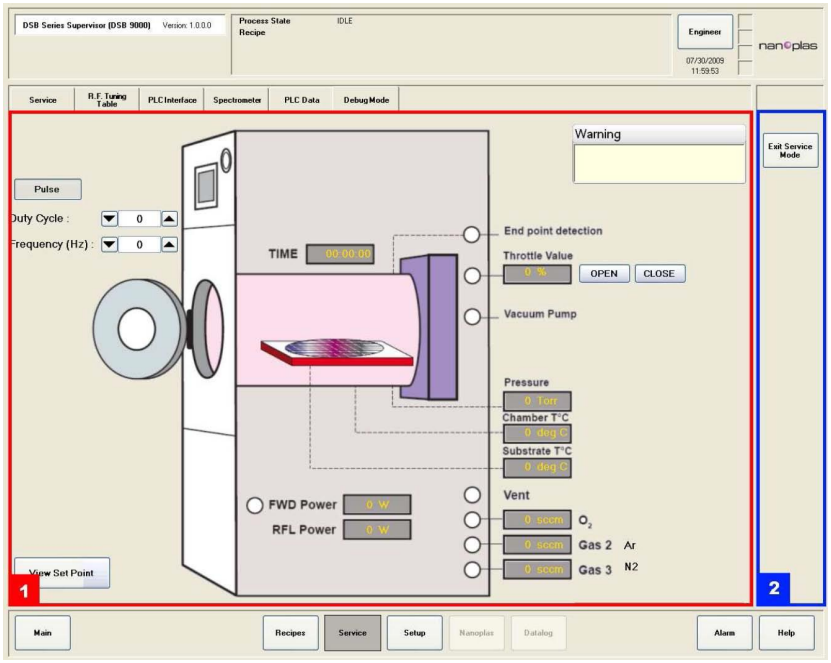


This information panel (**1**) is almost the same as Tool information panel in Main Menu. See §5.1 Tool tab for details. In the following section specific functionalities of debug mode will be described. Command panel (**2**) contains **Exit Service Mode** button. Click on it to go out of Service Mode.

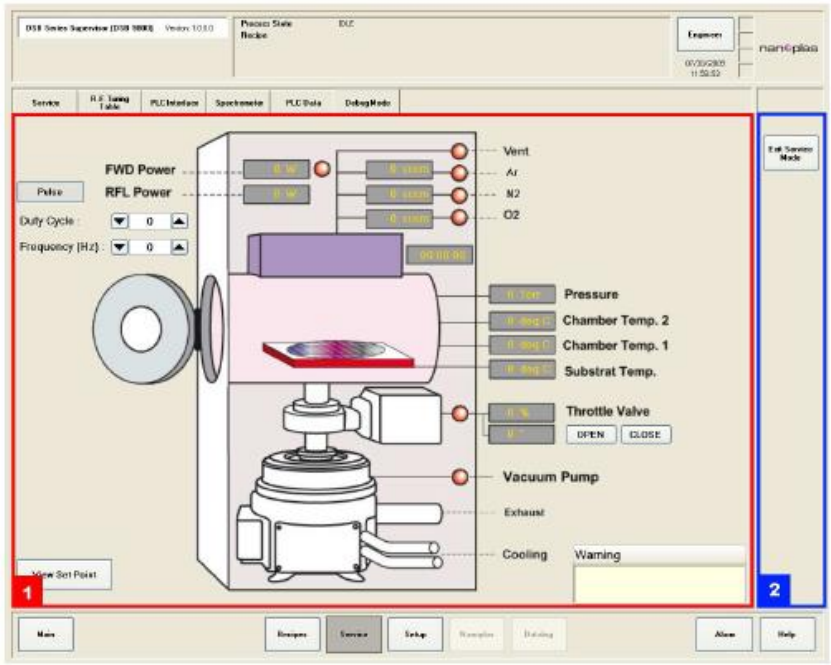
7.6.2.1. DISPLAYED DEVICE

Synopsis is updated to be compliant with selected kind of tool. There are 2 possibilities:

- DSB 9000



- DSB 6000



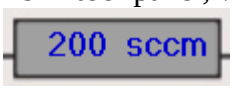
7.6.2.2. ACTUATOR COMMANDS

Most of the actuators (LED representation) can be commanded by clicking on theirs representations. If command is possible, the mouse cursor becomes a hand. When actuator is ON, the LED is green.

7.6.2.3. SET POINT CONFIGURATION

Set point for debug process values can be configured by clicking on the corresponding display (when mouse is over a configurable value the cursor changes into a hand). Once a configurable value is clicked, you can type your set point value.

Validate the value by pressing the enter key, or clicking on **View Set Point** button.
As in tool panel, when View Set Point button is pushed all set point values are displayed.



7.6.2.4. CHAMBER TEMPERATURES

In debug mode values of the two chamber's temperature probes are displayed but there is only one set point for chamber temperature. That is why only the **Chamber Temp 1** display can be clicked to configure set point.

7.6.2.5. CYCLE DURATION

In debug mode there is no set point for cycle duration. The displayed value corresponds to the elapsed time since RF generator has been turned on.

7.6.2.1. THROTTLE VALVE COMMAND

Command of throttle valve has a specific way of functioning. It can be configured by three methods. Clicking on **OPEN** button will open entirely the valve, clicking on **CLOSE** button will close entirely the valve and entering a pressure set point will activate the valve regulation. It is always the last sent command that is taken into account.
Moreover in debug mode the throttle value is displayed in percentage and angle (degree) units.

7.6.2.1. PULSE OPTION

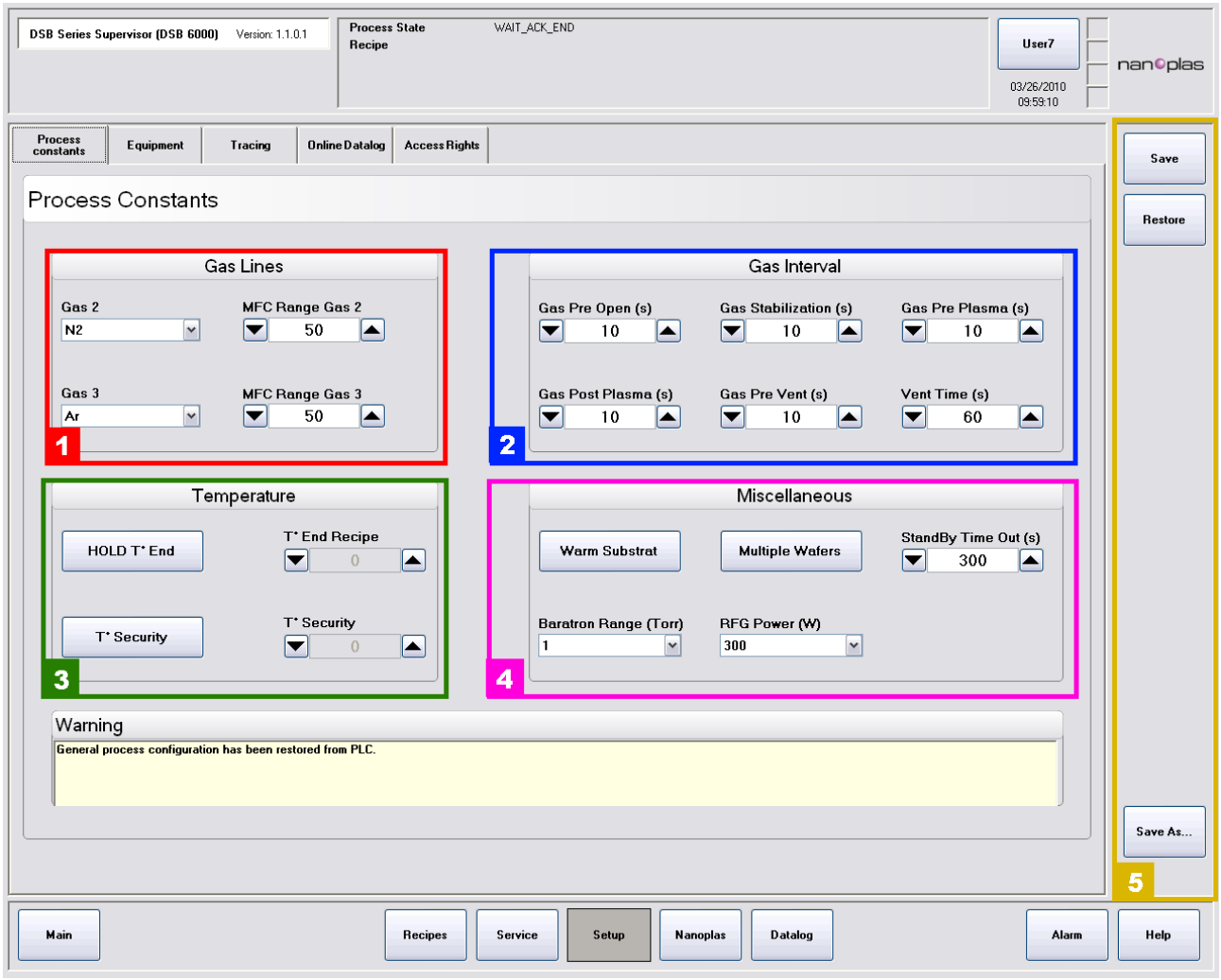
Pulse option can be enable by clicking on **Pulse** button. When pulse is enabled **Duty Cycle** and **Frequency** controls are displayed and allow operator to configure the pulse. When pulse is disabled, these controls are hidden.

8. "SETUP" MENU

8.1. PROCESS CONSTANTS TAB

8.1.1. *PRESENTATION*

This tab allows an advanced user to configure general process values.



It is composed of four parts, **Miscellaneous** area (1), **Gas Interval** area (2), **Temperature** area (3) and **Gas lines** area (4). These areas are described below.

Command panel (5) contains three buttons. **Save** button will save the displayed configuration inside PLC memory when it is clicked. **Restore** button load configuration stored inside PLC memory when it is clicked. **Save As…** button is not used in this tab because process constants can only be saved inside PLC memory.

8.1.1.1. MISCELLANEOUS

Warm Substrate button enable the substrate warming when it is checked, disable it elsewhere.

Multiple Wafers button changes the wafer representation in **Tool** tab (main menu) and **Debug Mode** tab (service menu). Display a cassette when it is checked, a single wafer elsewhere.

Baratron Range selection field configure maximum value, in Torr unit, detected by the baratron. It can be 1, 2 or 10 and must be compliant with the physical baratron.

RFG Power selection field configure maximum value, in Watt unit, of RF generator. It can be 300, 600 or 1000 and must be compliant with the physical RF generator.

StandBy TimeOut configures the time at which the machine goes in StandBy Mode. It can be 0 (functionality deactivated up to 3600 s).

8.1.1.2. GAS INTERVAL

Gas Pre open configures the amount of time before opening gas valves.

Gas Stabilization configures the amount of time before attempting to reach the pressure set point.

Gas Pre Plasma configures the amount of time before activating the RF generator.

Gas Post Plasma configures the amount of time before closing the gas valves.

Gas Pre Vent configures the amount of time before closing the vacuum valve.

Vent Time configures the amount of time before considering that atmospheric pressure is reached and asking for operator acknowledge at the end of process.

8.1.1.3. TEMPERATURE

HOLD T° Temp button determines if temperature should be maintained at the end of recipe. When this button is checked **T° End Recipe** field is enabled and its value configures the chamber temperature at the end of recipe.

T° Security button determines if temperature could generate an alarm. When this button is checked **T° Security** field is enabled and configures the maximum chamber temperature before generating an alarm.

8.1.1.4. GAS LINE

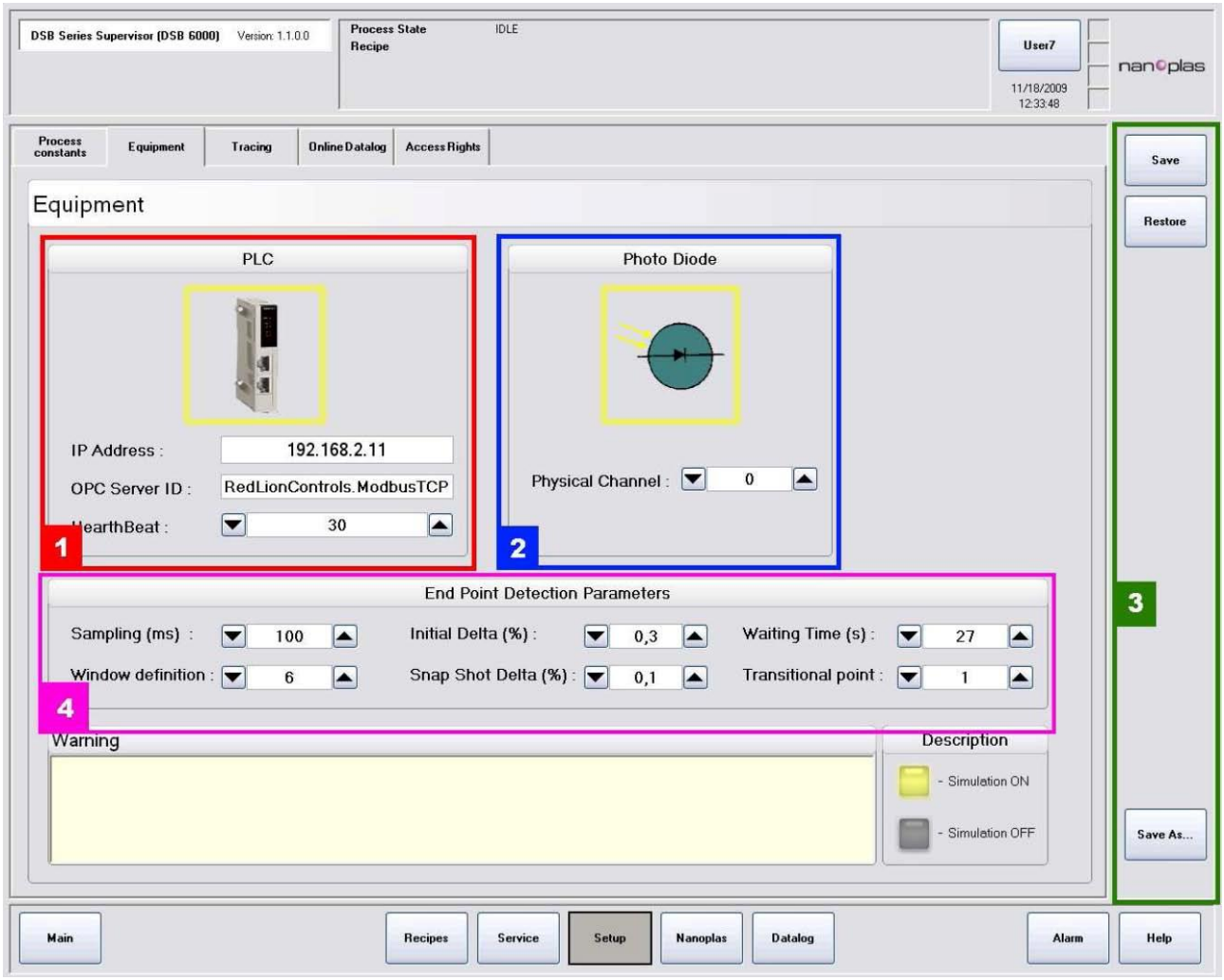
Gas 2 selection field determine the secondary gas kind. It could be N2, Ar, ArH2, CF4, SF6 and HeH2. The maximum range of Mass Flow Controller for this gas line is configured in **MFC Gas 2 Range** field.

Gas 3 selection field determine the third gas kind. It could be N2, Ar, ArH2, CF4, SF6 and HeH2. The maximum range of Mass Flow Controller for this gas line is configured in **MFC Gas 3 Range** field.

8.2. EQUIPMENT TAB

8.2.1. ***PRESENTATION***

This tab allows user to configure equipment which software communicates with.

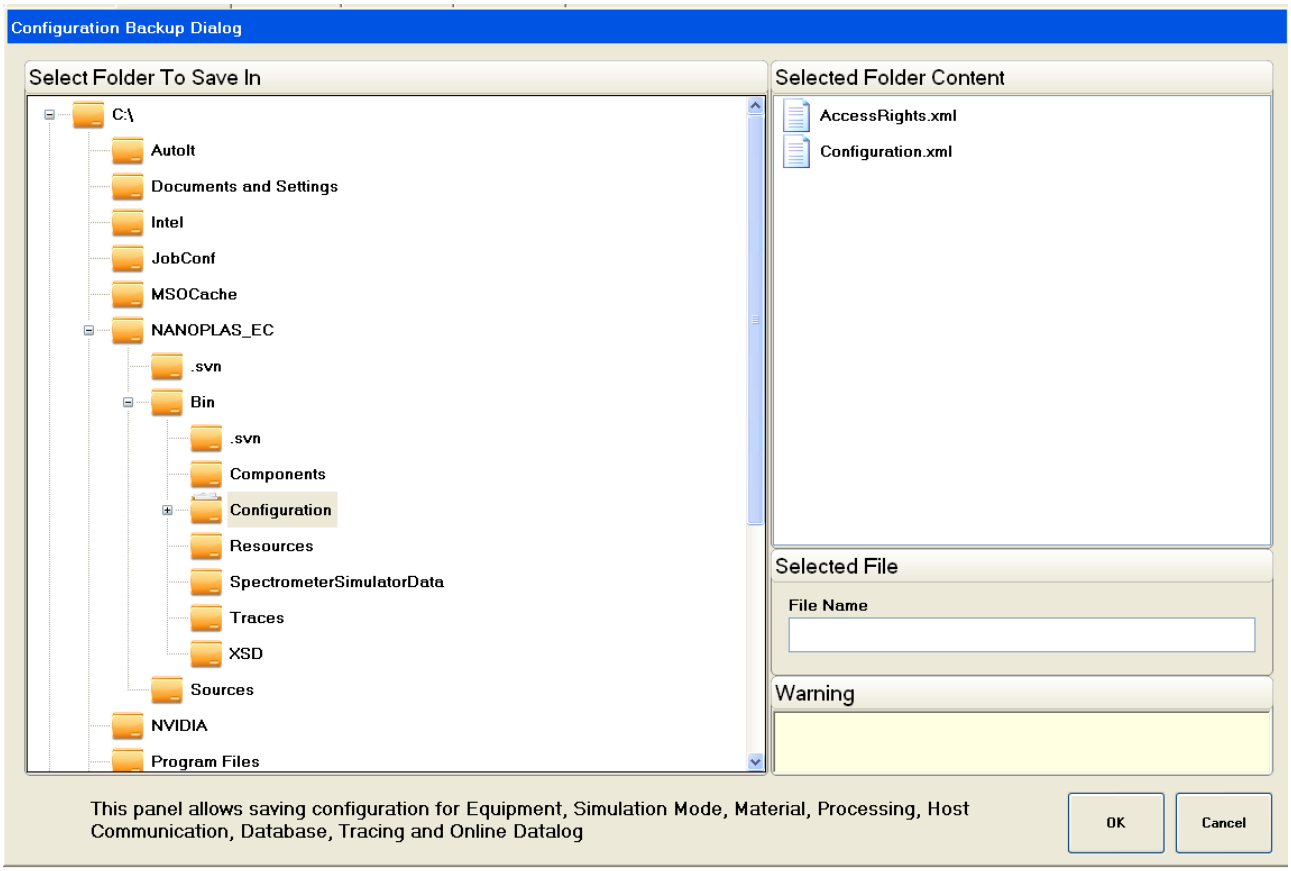


PLC area (1) contains configuration for its **IP address**, the name of **OPC Server** and communication **HearthBeat** timeout (in millisecond). By clicking on PLC's picture simulation mode can be enabled or disabled.

Area (2) allow operator to configure either photodiode, either spectrometer functionality. These two areas are optional and may be not displayed if those functionalities are not installed on device.

Command panel (3) allows user to save changes made. In order to save changes, **Save** button must be clicked. To restore previous saved configuration, click on **Restore** button. **Save As…** button can

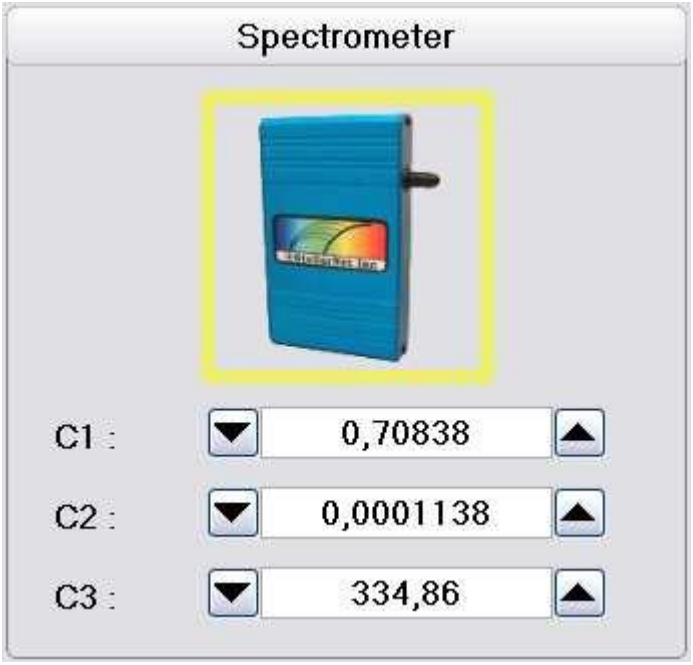
be used to save configuration in a specific directory. When this button is clicked the following window is shown.



The user selects a folder, an existing file or types a file name, and click **OK** to validate the backup. If button **Cancel** is clicked the operation is cancelled and process constants are shown.

End point detection parameters (4) allow operator to configure the end point detection functionality. This area is optional and may be not displayed if Spectrometer or Photo Diode device are not installed on device.

8.2.1.1. SPECTROMETER END POINT SYSTEM



Spectrometer area (**2**) contains values used to convert CCD detector pixel into wavelength. These values must corresponds to those wrote on the spectrometer. By clicking on spectrometer's picture simulation mode can be enabled or disabled.

8.2.1.2. PHOTO DIODE END POINT SYSTEM

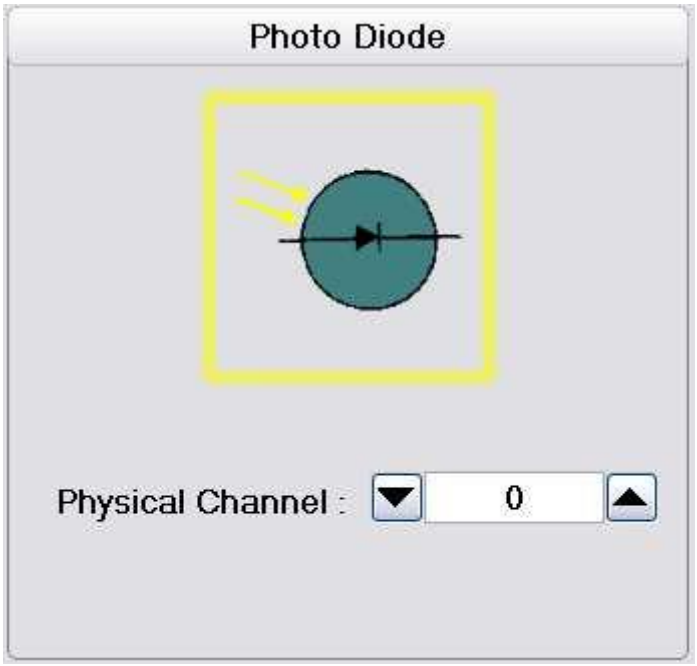
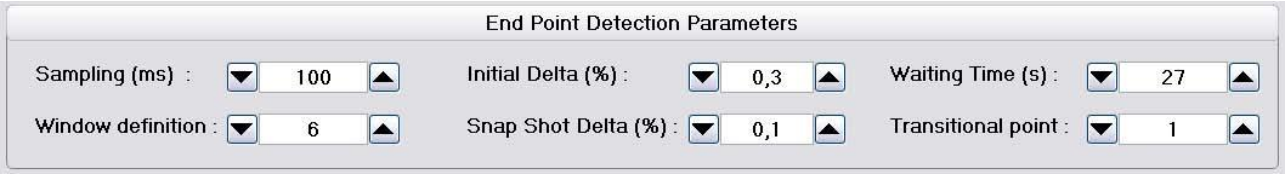
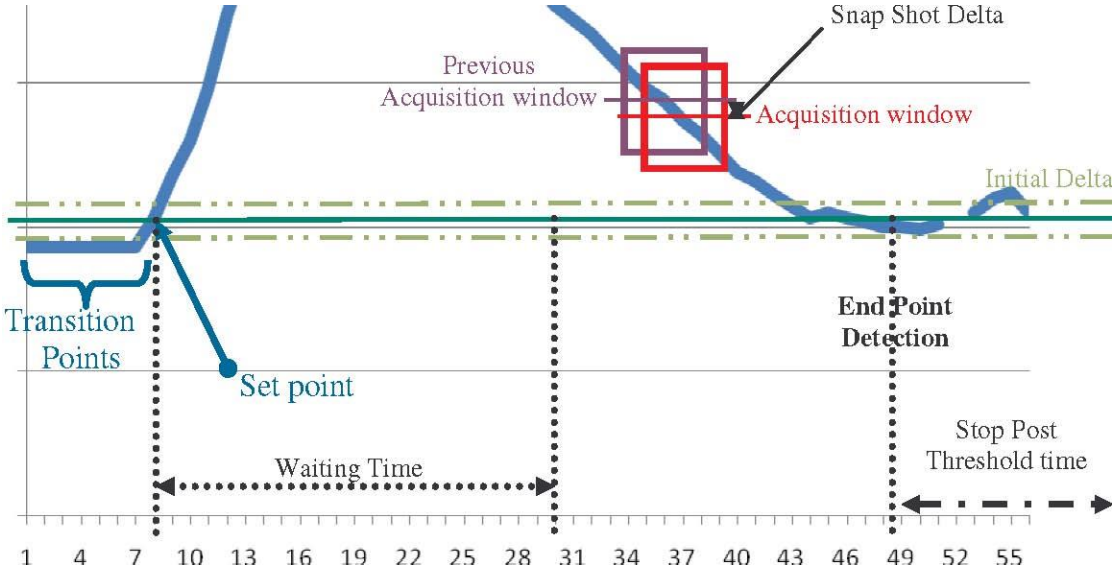


Photo Diode area (**2**) contains values used to select hardware input to read intensity values. By clicking on photodiode's picture simulation mode can be enabled or disabled.

8.2.1.3. END POINT DETECTION PARAMETERS



This area allows to configure the algorithm of end point detection independently of device used (spectrometer or photo diode). Device performs data acquisition at the **Sampling** period. Below an acquisition done using a photo diode device:

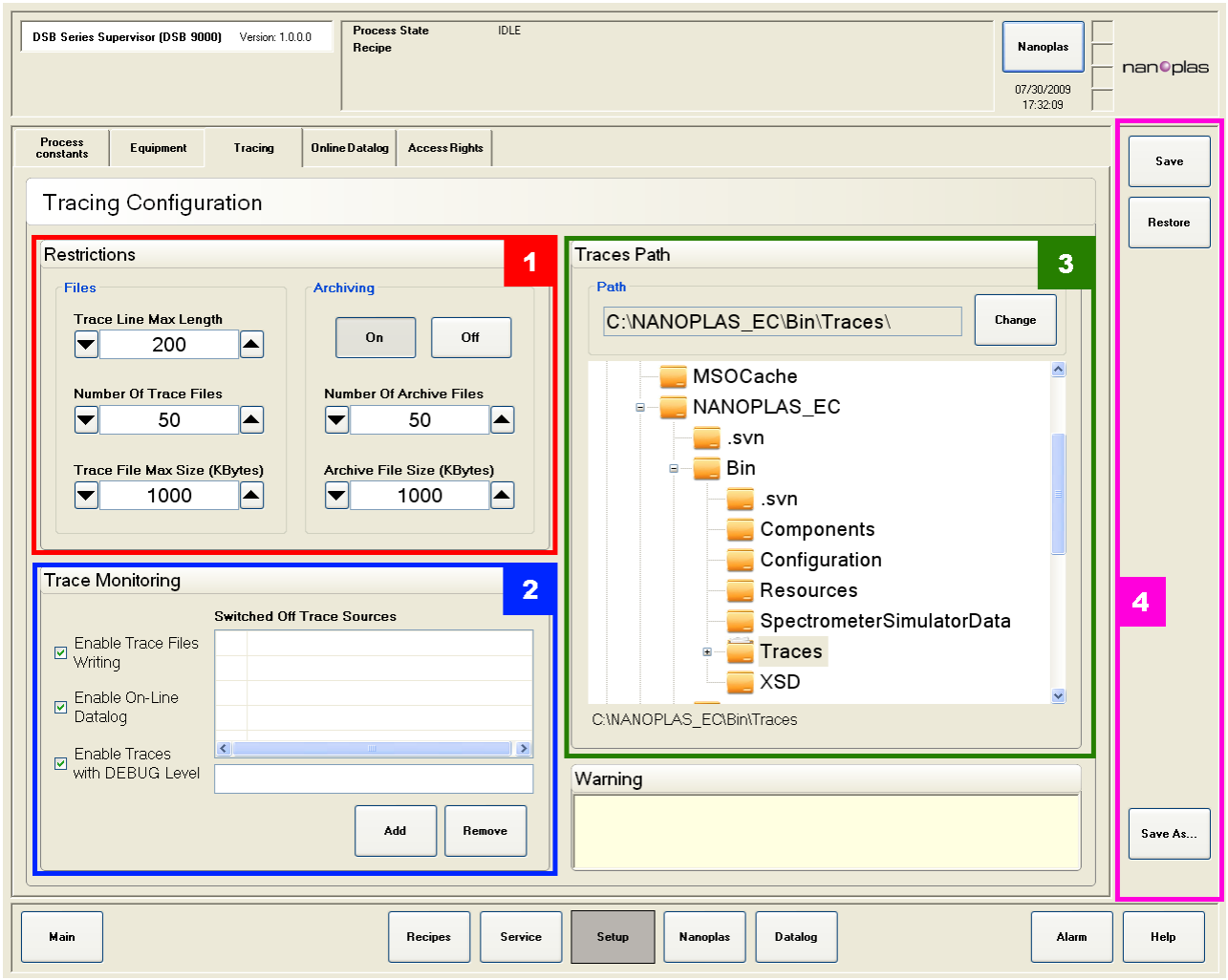


The Window definition indicates how many acquisitions shall be taken into account to perform the average. **Transitional points** define the number of acquisition ignored after the activation of the end point detection device. The **Waiting Time** indicates how long values are not significant. **Snap Shot Delta** and **Initial Delta** indicates the tolerance between current and compared measures About the Stop Post Threshold Time, refer to section 6.2.2.4 End Point System option

8.3. TRACES TAB

8.3.1. *PRESENTATION*

Traces tab allows an advanced user to setup traces recording.



Restrictions area (1) configures some limit to trace files. Following parameters can be configured:

- **Trace Line Max Length**, between 10 and 300 letters
- **Number Of Trace Files**, between 1 and 256
- **Trace File Max Size (Kbytes)**, between 16 and 2000 Kbytes
- **Number Of Archive Files**, between 1 and 256
- **Archive File Size (Kbytes)**, between 20 and 2000 Kbytes

It is also possible to enable or disable archiving functionality by clicking on **On** or **Off** buttons.

Trace Monitoring area (2) allows filtering trace writing. It contains three checks fields used to:

- Enable / Disable trace files writing
- Enable / Disable On-Line datalog
- Enable / Disable debug level traces.

This area also contains functionality to disable the writing of specific trace's sources. Type a trace source in the field and click on **Add** button to add it on the Switched-off list. Select an item in the list and click on **Remove** button to remove it from the switched-off list.

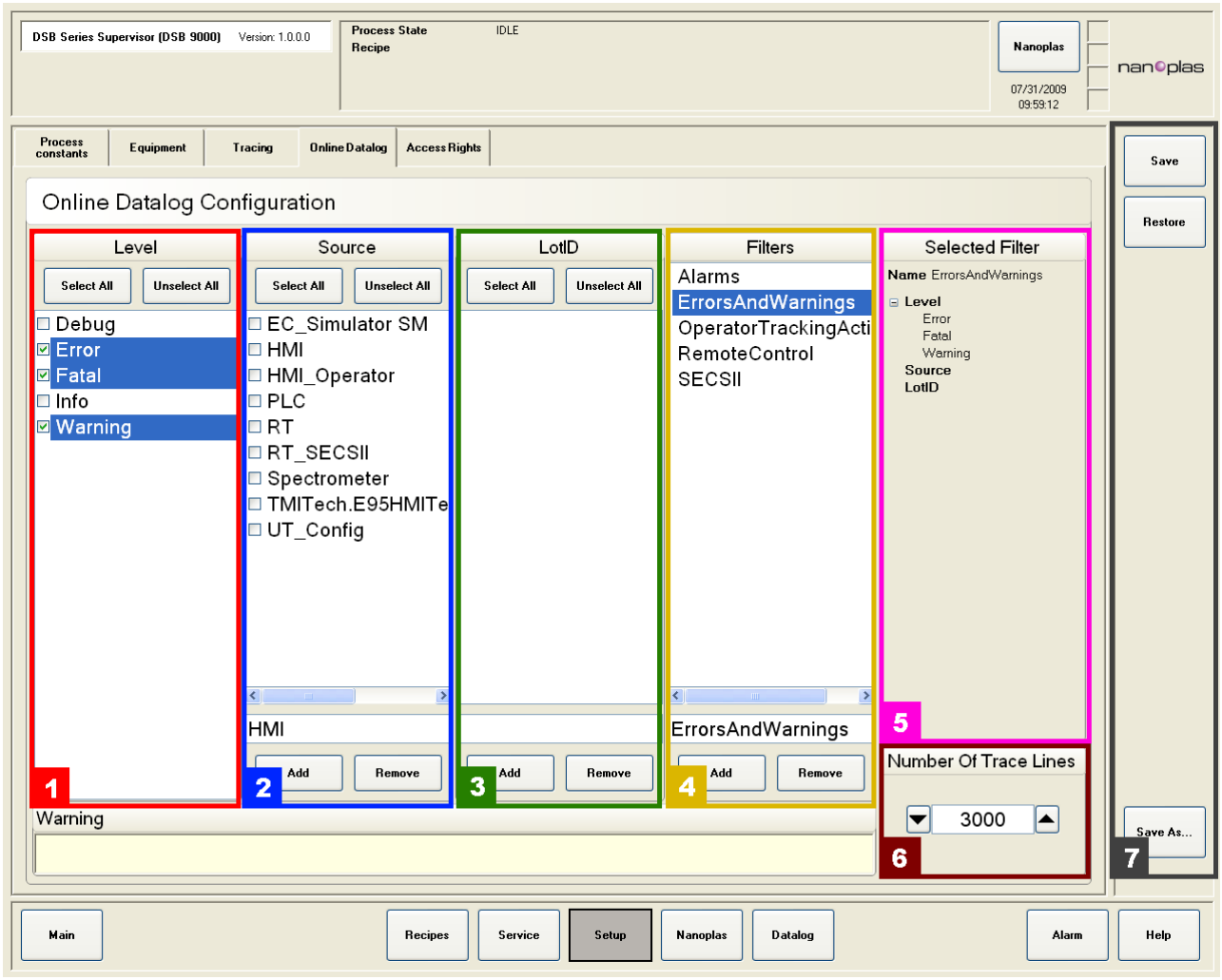
Traces Path area (3) is used to specify the repertory in which traces will be saved. To modify this path, select a folder and then click on **Change** button.

Command panel (4) is same as in §8.2 Equipment Tab. See this section to detailed explanations.

8.4. ONLINE DATALOG TAB

8.4.1. ***PRESENTATION***

Online Datalog tab allows an advanced user to setup predefined filters for datalogs.



Level area (1) configures level of traces to be displayed when filter is applied. All levels are listed and can be selected independently by checking them.

Source area (2) configures source of traces to be displayed when filter is applied. All sources are listed and can be selected independently by checking them. If needed, an advanced user can add or remove sources.

LotID area (3) usually configures lotID traces to be displayed when filter is applied but it is not used in this software.

Filters area (4) displays the list of predefined filters already configured. To add a new filter, type a name in the field above buttons and click on **Add**. To remove a filter, select an existing filter in the list and click on **Remove** button. To edit a filter, select an existing filter and modify its **Level** and/or **Source**.

Selected Filter area (5) reminds the configuration of selected filter.

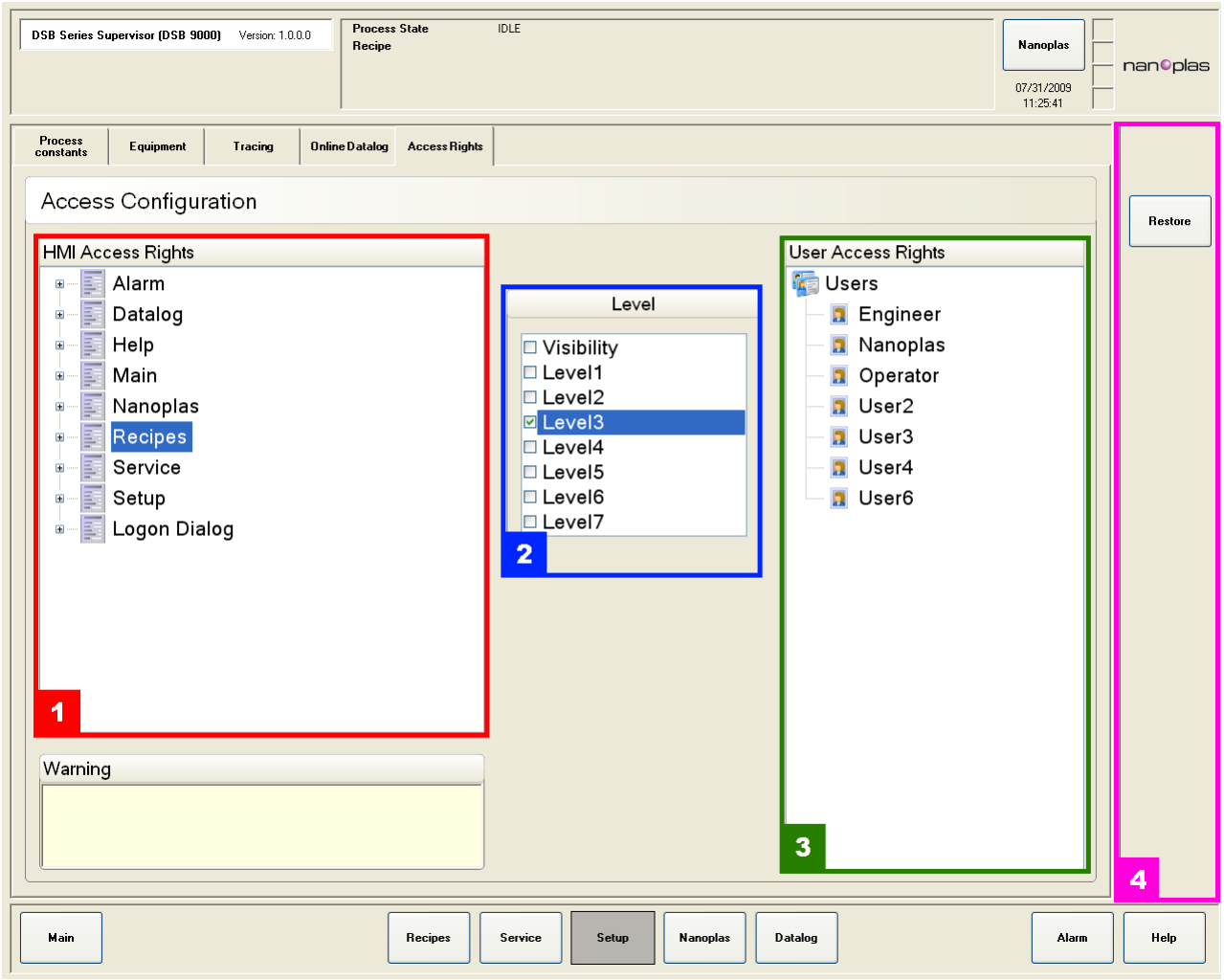
Number of Trace (6) configures the number of trace displayed inside software. Only last traces are displayed.

Command panel (7) is same as in §8.2 Equipment Tab. See this section to detailed explanations.

8.5. ACCESS RIGHTS TAB

8.5.1. ***PRESENTATION***

Access Rights tab allows user to choose the level needed to access all different HMI parts. It is also used to manage the list of users and theirs level access.



8.5.2. *HMI'S ACCESS RIGHT*

HMI Access Rights area (1) lists all parts of software. When an element list is selected its access level is displayed in **Level** area (2). To modify the level access of selected HMI part, click on an element of level list.

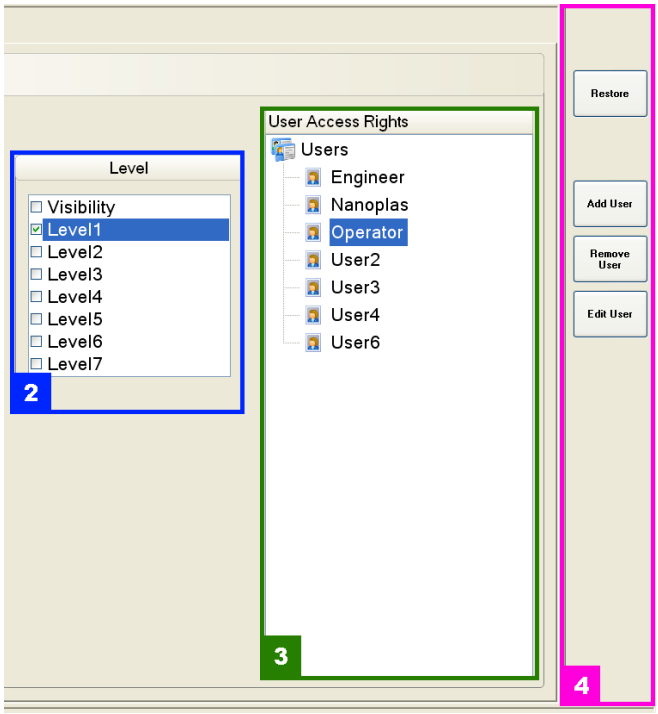
Levels go from **Visibility** through **Level 7**. Visibility level is the lowest level, and Level 7 the highest. Visibility level does not need to be connected to access on controls.

If a level is affected to a menu, all its sub-menus could not have a lower level (a higher level is still possible for sub-menus).

8.5.3. ***USER MANAGEMENT***

8.5.3.1. KNOW A USER ACCESS LEVEL

To know a user access level, click on an item of **User Access Rights** list (3). The **Level** area (2) will be updated with the user's level.



Here, **Operator** user has a level access of **1**.

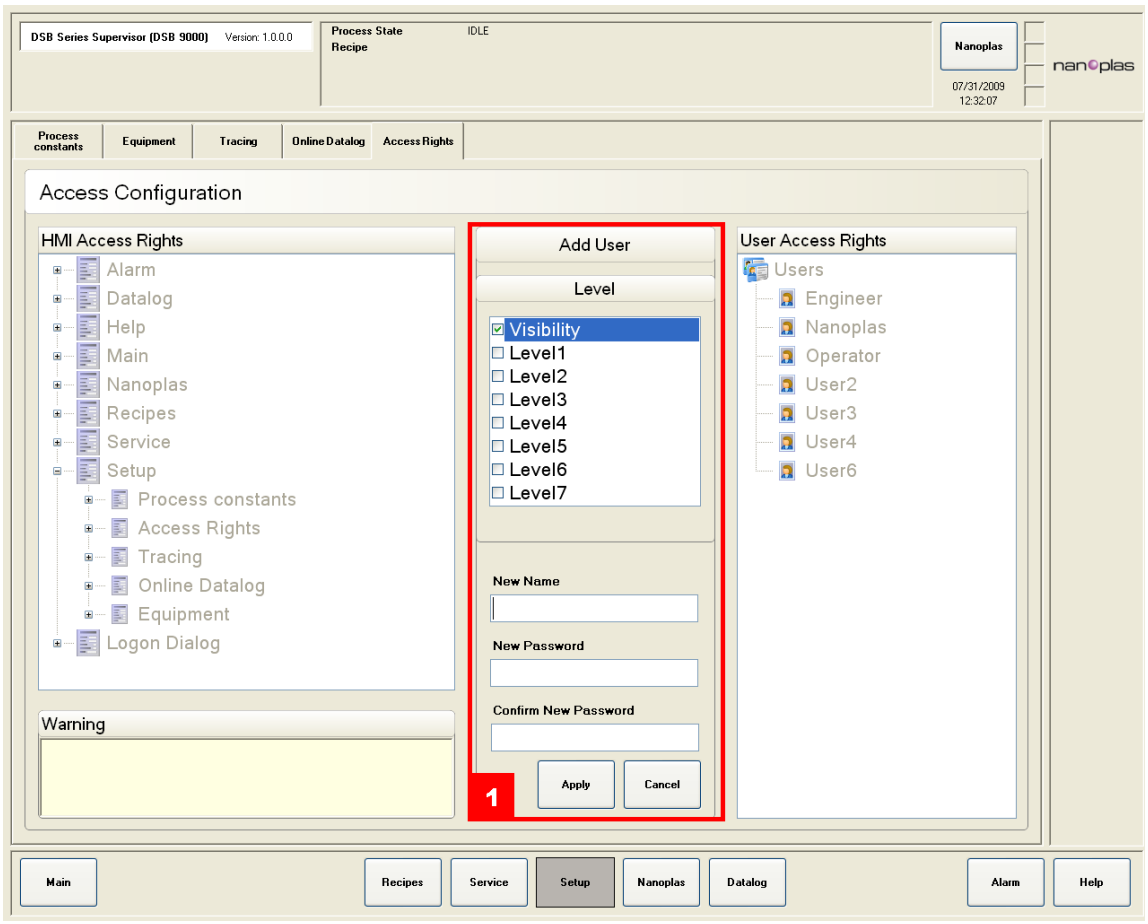
Once a user is selected, some buttons appears on command panel (4). This button will be described in following section.

8.5.3.2. CHANGE A USER LEVEL ACCESS

To change a user level access, select an existing user in the list (3) and then select the new level access in **Level** list (2). In order to apply changes click on **Save And Apply** button inside command panel.

8.5.3.3. ADD A USER

To add a user click on **Add User** button (if it is not displayed, select an existing user). The information panel becomes as follow:



To add a user, select its level access, enter a name and a password and click on **Apply** button. **Cancel** button allows cancelling the operation.

8.5.3.4. EDIT A USER

To edit a user, first select an existing user and then click on **Edit User** button. Information panel becomes as in previous section, see §8.5.3.3 Add a user. Modify user configuration as you wish and click on **Apply** button to validate changes, or **Cancel** to abort the operation.

8.5.3.5. DELETE A USER

To delete a user, select an existing user and click on **Remove User** button. Be careful there is no warning message before removing a user.

8.5.3.6. SAVE AND RESTORE

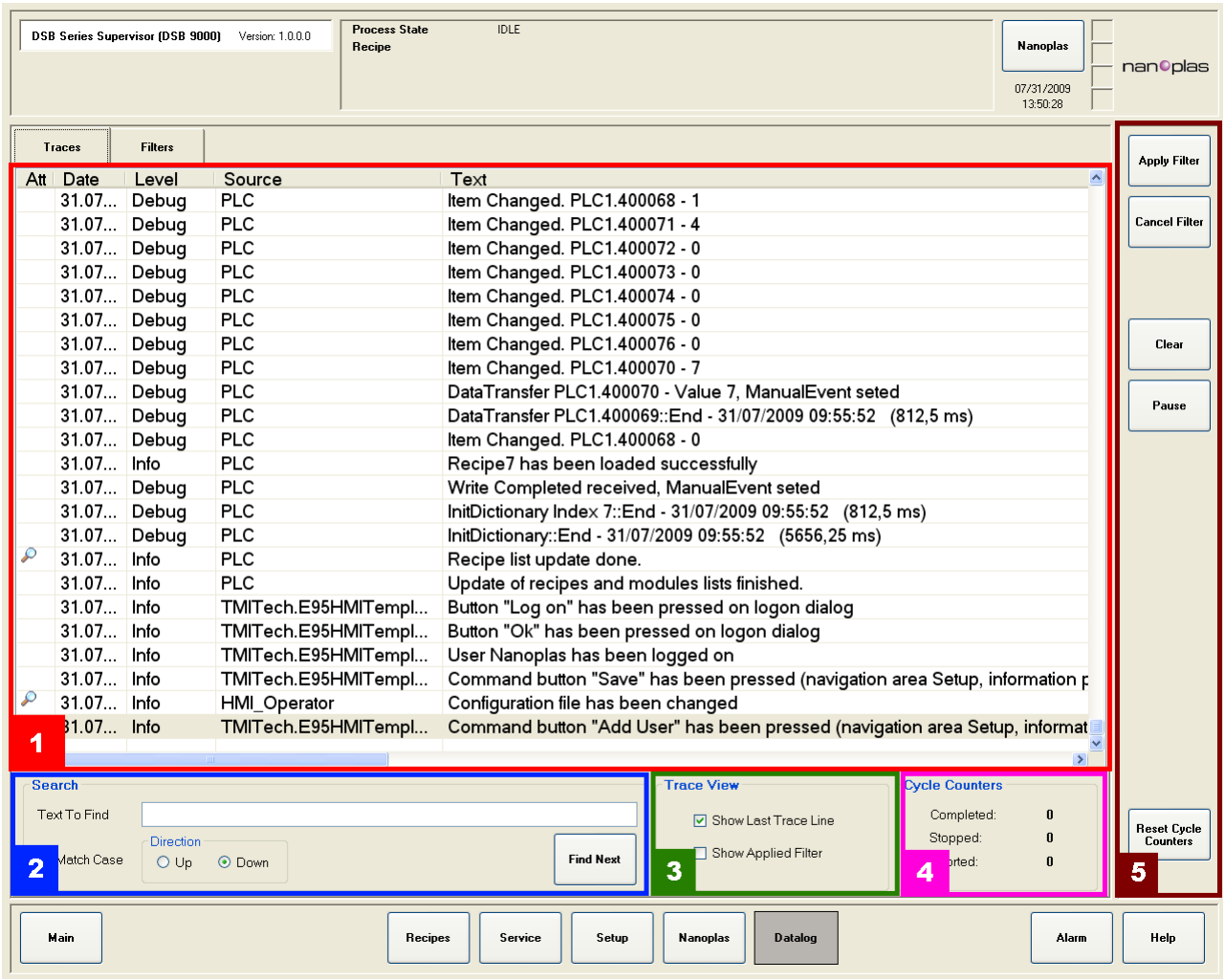
After any changes on **Access Rights** tab it is possible to **Restore** last saved configuration or to **Save And Apply** the new parameters. Those buttons are located inside command panel.

9. "DATALOG" MENU

9.1. TRACES TAB

9.1.1. *PRESENTATION*

Traces tab displays traces that were generated during software execution.



Traces are displayed in real time inside **List** area (1). It is possible to pause displaying traces by clicking on **Pause** button. To resume trace display, click on **Resume** button.

Traces can be cleared by clicking on **Clear** button.

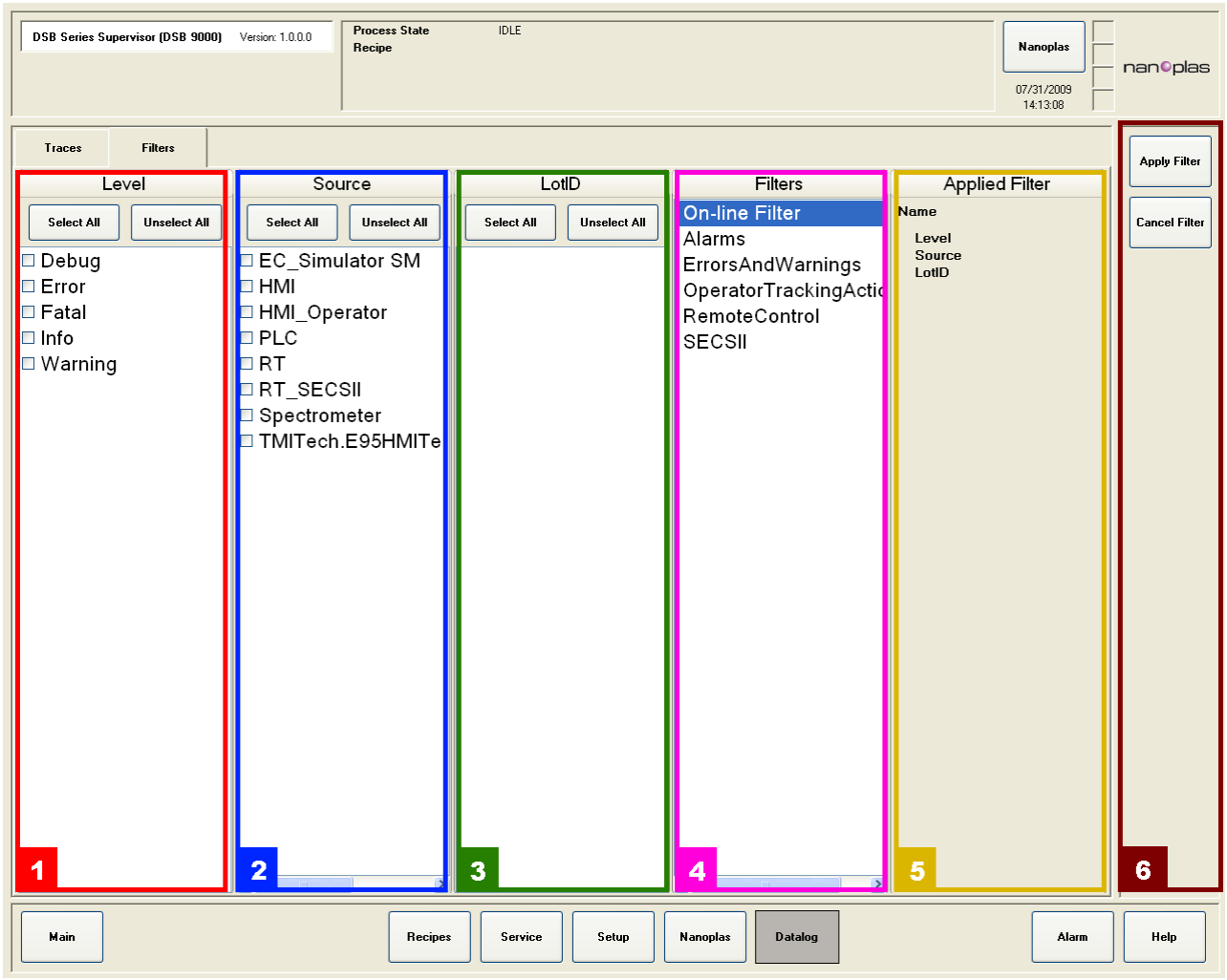
Search area (2) allows user to easily find a trace. Type the text to find in **Text To Find** field, select if results should match searched text case and choose the find direction. Clicking on **Find Next** button display the next trace corresponding to text to find.
Trace View area (3) determines if the last trace line and applied filters should be displayed. When **Show last Trace line** is checked the list is updated in real time to display the last occurred trace.

Cycle Counters area (4) is not active in this software, so **Reset Cycle Counters** button on command panel do nothing.

9.2. FILTERS TAB

9.2.1. ***PRESENTATION***

Filters tab allow user to choose filters to apply on displayed traces.



To apply a filter the user can choose **Level** (1) and **Source** (2) of trace to display. **LotID** (3) are not activated in this software.

It is also possible to choose a predefined filter (4). Predefined filter configuration is explained in § 8.4 Online datalog tab.

Applied filter is reminded in **Applied Filter** area (5)

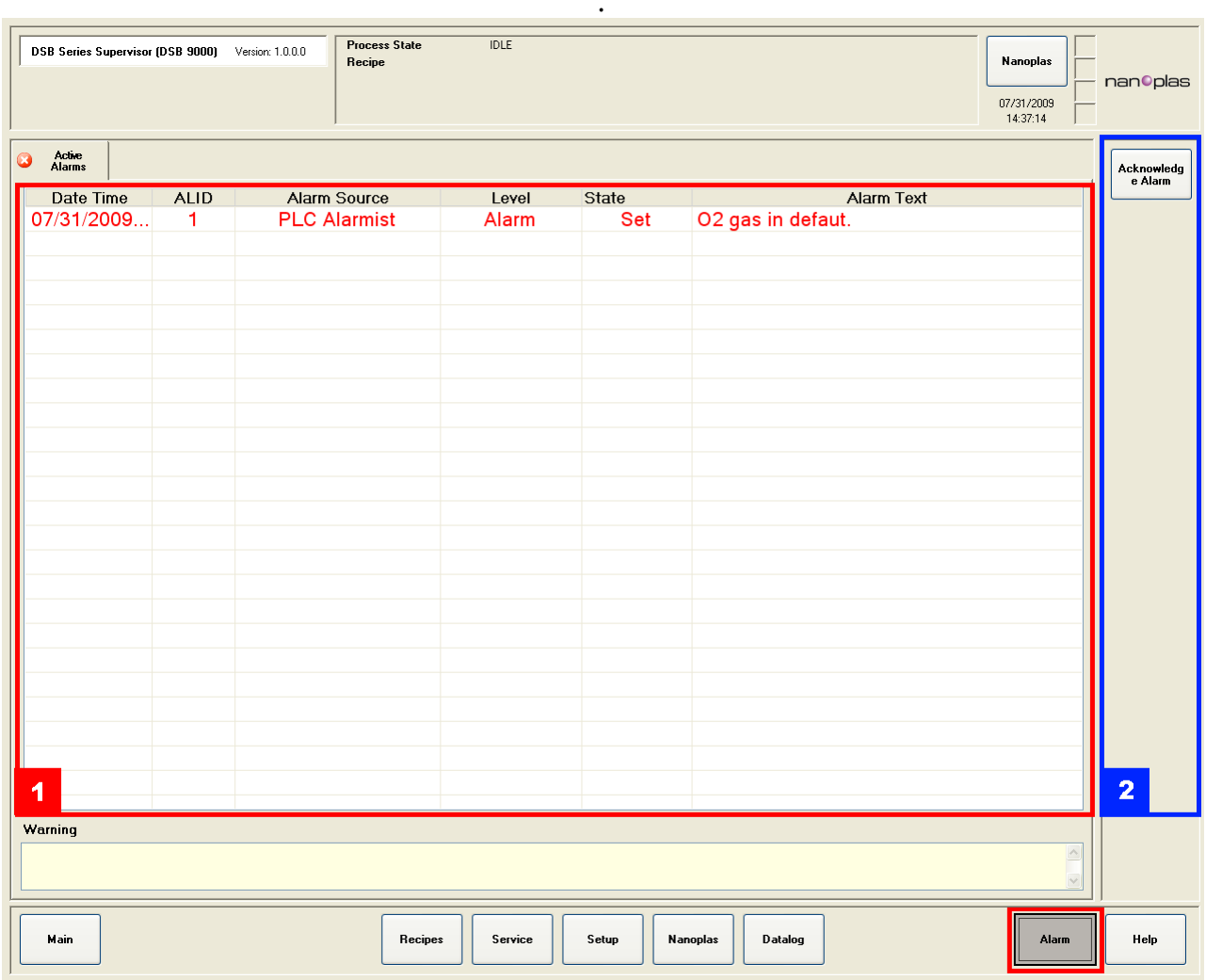
To apply a filter, click on **Apply Filter** button. To clear all applied filter click on **Cancel Filter** button in command panel (6).

10. "ALARM" MENU

10.1. ACTIVE ALARMS TAB

10.1.1. ***PRESENTATION***

Active Alarms tab list all alarms that occurred during software execution.



If an alarm is set its text color is red and **Alarm** button in navigation panel has a red salience. To acknowledge active alarms click on **Acknowledge Alarm** button. All alarm's text colour will come back to black.

11. "HELP" MENU

11.1. HELP TAB

11.1.1. ***PRESENTATION***

Help tab displays this help file.

11.2. ABOUT TAB

11.2.1. ***PRESENTATION***

About tab gives some information about NANOPLAS and Agileo Automation.